12th Annual Graduate Research Symposium

March 22-23, 2013

The College of
William & Mary
Williamsburg, Virginia

Table of Contents

Schedule at a Glance

Friday, March 22, 2013 -- Sadler Center

8:00 am - 8:30 am	Registration *Second Floor Lobby*
8:30 am - 5:00 pm	Poster Displays *Second Floor Lobby*
8:30 am - 9:30 am	Concurrent Sessions *Tidewater A, Tidewater B, Chesapeake C, James Room, York Room and Colony Room*
9:45 am - 10:45 am	Concurrent Sessions *Tidewater A, Tidewater B, Chesapeake C, James Room, York Room and Colony Room*
10:55 am - 11:55 am	Concurrent Sessions *James Room and York Room*
11:00 am - 12:00 pm	Poster Presentations with Q&A *Second Floor Lobby*
12:00 pm - 1:00 pm	Luncheon & Welcoming Remarks *Chesapeake A*
1:00 pm - 2:00 pm	Concurrent Sessions *Tidewater A, Tidewater B, Chesapeake C, James Room and Colony Room*
2:15 pm - 3:15 pm	Concurrent Sessions *Tidewater A, Tidewater B, Chesapeake C, James Room and York Room*
3:30 pm - 5:00 pm	Professional Development Workshop *Cohen Career Center*
5:00 pm - 6:00 pm	Evening Networking Reception *Cohen Career Center*

Saturday, March 23, 2013 -- Sadler Center

8:00 am - 8:30 am	Registration *Second Floor Lobby*
8:30 am - 12:00 pm	Poster Displays *Second Floor Lobby*
8:30 am - 9:30 am	Concurrent Sessions *Tidewater A, Tidewater B, Chesapeake C, James Room, York Room and Colony Room*
9:40 am - 10:40 am	Concurrent Sessions *Tidewater A, Tidewater B and York Room*
10:50 am - 11:50 am	Concurrent Sessions *Tidewater A and York Room*
11:00 am - 12:00 pm	Poster Presentations with Q&A *Second Floor Lobby*
12:00 pm - 1:30 pm	Luncheon & Awards Ceremony *Chesapeake A*

The 12th Annual Graduate Research Symposium

The College of William & Mary
Office of Graduate Studies and Research

Dear Members of The College of William & Mary Community and Guests,

Welcome to the 12th Annual Graduate Research Symposium at The College of William & Mary! After more than a decade, the Symposium retains its character as a student-run conference. For many graduate students the Symposium marks their first step into the formal world of academia. However, the Symposium is more than simply an opportunity to present your research: it is an opportunity to present, receive constructive feedback from affiliated faculty and fellow graduate students, as well as to establish relationships with your future colleagues. The Symposium is truly a forum for intellectual and professional development for junior scholars in the formative stage of their academic careers.

This year, as in years past, the Graduate Research Symposium will feature the work by current graduate students from William & Mary and eighteen visiting institutions. We hope that you will attend many of the approximately 125 engaging presentations that will enable a unique interdisciplinary conversation. This year our scholars come not only from Arts and Sciences at William & Mary, but also from eighteen visiting institutions including: The College of Charleston, Duke, Appalachian State, Georgetown, Towson, Hampton, the University of Georgia, George Mason, Tufts, the University of North Carolina - Wilmington, Marymount, Old Dominion, Georgia State, Georgia Southern, Towson, Virginia Tech, Virginia Commonwealth University, and the University of Virginia. The diversity of our presenters not only reflects the geographical reach of the symposium's reputation, but also the intellectual depth and breadth of the symposium.

Finally, the committee would especially like to thank all of the participants and most especially the College's graduate faculty, staff, administration, and the Graduate Studies Advisory Board for their commitment to graduate students and research.

I hope that you will find that this year's program continues the tradition of cultivating an environment of interdisciplinary intellectual exchange amongst our graduate peers and peer institutions. In this, my fifth and final year of chairing the Symposium, I thank you all for your support and for sharing your scholarship. On behalf of the committee, and myself, we wish you all the best of luck here and in all of your future graduate endeavors.

Kind Regards,

Alexandra Méav Jerome
Chair, Graduate Research Symposium
Ph.D. Candidate, American Studies

CHARTERED 1693

THE COLLEGE OF WILLIAM AND MARY
OFFICE OF THE PRESIDENT
P.O. BOX 8795
WILLIAMSBURG, VIRGINIA 23187-8795

757/221-1693, Fax: 757/221-1259

Dear Students and Friends,

Welcome to the twelfth annual Graduate Research Symposium at the College of William & Mary! It's grand to have you here.

The Symposium's theme – "Preparing Scholars, Presenting Excellence" – reflects William & Mary's mission in graduate education. Our students contribute seriously to human understanding on their way to advanced degrees. Then they continue to do so as teachers and scholars. The Symposium provides an opportunity for our graduate students and their peers from other schools to present their work, and for the William & Mary community to enjoy the presentations.

You have my best wishes for an enjoyable and rewarding time together.

Cordially,

W. Taylor Reveley, III
President

2013 Graduate Research Symposium

Program Chair
Alexandra Méav Jerome, *American Studies*

Graduate Student Committee
Libby Cook, *History*
Ashley Irizarry, *History*
Shaun Richards, *American Studies*
Amy Russell, *COR*
Helis Sikk, *American Studies*
Jennifer Thorne, *COR*

Office of Graduate Studies and Research
Dean John Swaddle, *Graduate Studies*
Chasity Roberts
Aundrea Baker
Wanda Carter
Vicki Thompson Dopp

Distinguished Speakers
President W. Taylor Reveley, III
Provost Michael R. Halleran
Vice Provost Dennis Manos
Dean Katherine Conley, *Arts and Sciences*

Sponsors
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Session Chairs
Aroma's of Williamsburg
Qdoba Mexican Grill
Sadler Center Operations & Tech Services
Office of Student Activities Scheduling Office
William & Mary Catering Service
William & Mary Information Technology
Williamsburg Hospitality House

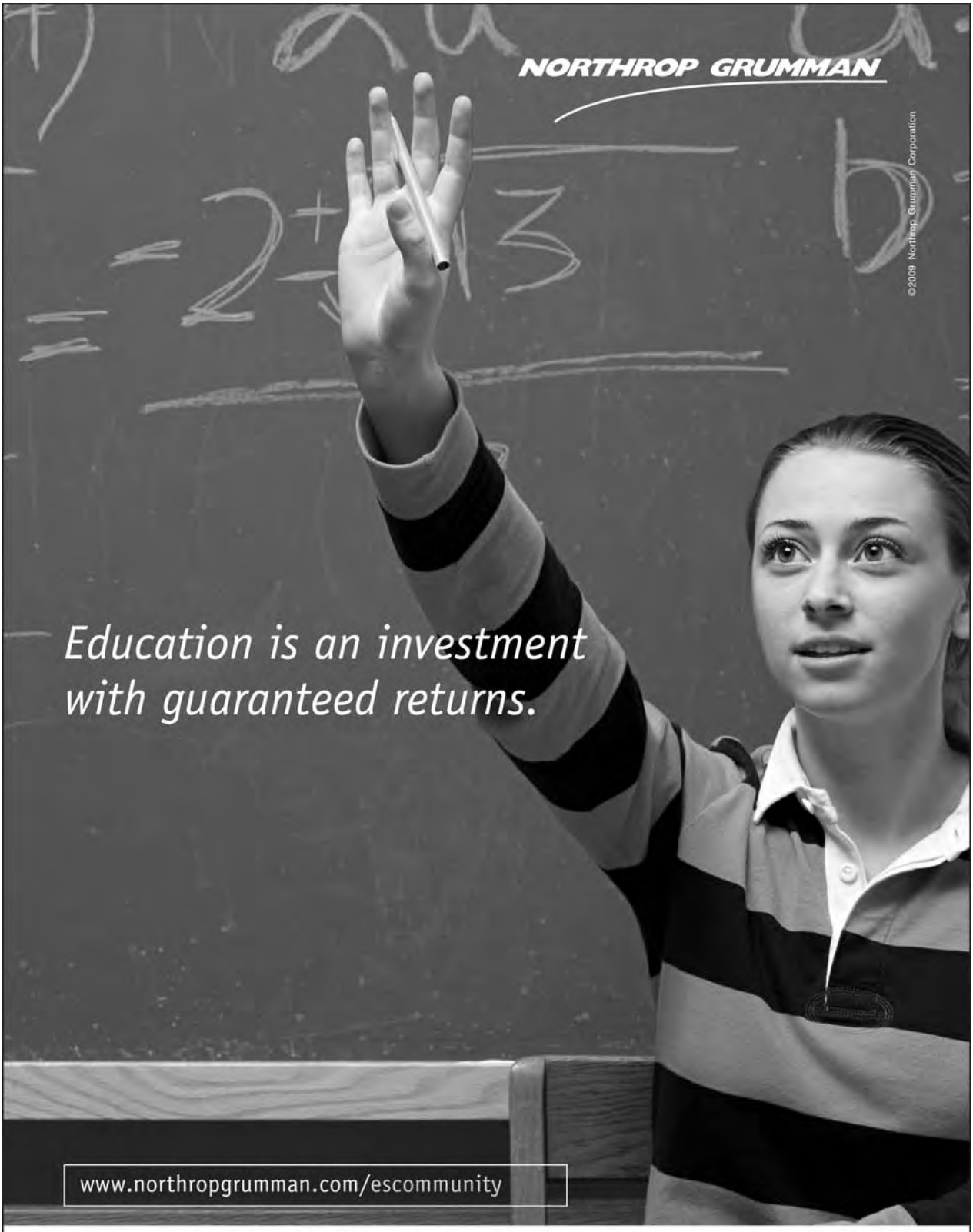
Judging Panel
Graduate student poster and oral presenters were eligible to submit a paper for award consideration in the disciplinary category of their choosing. The names and institutions of the students and advisors were removed from the submissions prior to evaluation by the judging panel. Advisors whose students submitted papers recused themselves from ranking those papers. W&M Master's students were eligible for the Corporate Awards, the W&M Awards for Excellence, and the Carl J. Strikwerda Awards.

Humanities & Social Sciences
Dr. John Burton, *Graduate Studies Advisory Board*
Prof. Elaine McBeth, *Public Policy*
Larry McEnerney, *Graduate Studies Advisory Board*
Dr. Charles McGovern, *American Studies*
Dr. Neil Norman, *Anthropology*
Dr. Ayfer Stump, *History*
Dr. Todd Thrash, *Psychology*

Natural & Computational Sciences
Dr. Peter Martin, *Graduate Studies Advisory Board*
Dr. Denys Poshyvanyk, *Computer Science*
Dr. Bill Tropf, *Graduate Studies Advisory Board*
Dr. Patricia Vahle, *Physics*
Dr. Matthew Wawersik, *Biology*

Mentoring Awards: Humanities & Social Sciences
Dr. Marley Brown, *Anthropology*
Dr. Pam Hunt, *Psychology*
Prof. Elaine McBeth, *Public Policy*
Dr. Charles McGovern, *American Studies*
Dr. Ayfer Stump, *History*

Mentoring Awards: Natural & Computational Sciences
Dr. Pam Hunt, *Psychology*
Dr. Pieter Peers, *Computer Science*
Dr. Patricia Vahle, *Physics*
Dr. Patty Zwollo, *Biology*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The College of William & Mary
Award Recipients for Excellence in Scholarship

These awards acknowledge graduate students whose research presentation demonstrates original investigation and the integration of knowledge, and distinguished excellence in scholarship through potential contribution to the discipline and recognition by peers.

To be considered for an award, presenters had to submit a 5-6 page paper describing their research. The papers were judged blindly by an independent panel of William & Mary faculty and Graduate Studies Advisory Board members. The papers by the following students were selected to merit an award among the many outstanding submissions. The corporate sponsored awards listed below were open to students from the College of William & Mary.

MARKET ACCESS INTERNATIONAL, Inc. (www.marketaccessintl.com) is an international trade, investment and enterprise growth consulting firm. The company was founded by Arts & Sciences Graduate Studies Advisory Board member Diane Alleva Cáceres (W&M '87 BA Economics, '89 MA Government).

MARKET ACCESS INTERNATIONAL, Inc. Award for Excellence in Scholarship in the Humanities and Social Sciences

SARAH STANFORD-MCINTYRE
The College of William and Mary, American Studies, Advisor: Dr. Arthur Knight
"The First Fruits of the New Age," Grain Elevators in the American Landscape

********Join Sarah as she presents her research Friday, March 22, 2013 ********
from 8:30am-9:30am in James Room

NORTHROP GRUMMAN CORPORATION (www.northropgrumman.com) Northrop Grumman Corporation is a leading global security company whose 120,000 employees provide innovative systems, products, and solutions in aerospace, electronics, information systems, shipbuilding and technical services to government and commercial customers worldwide.

NORTHROP GRUMMAN CORPORATION Award for Excellence in Scholarship in the Natural and Computational Sciences

JESSICA EBERS
The College of William and Mary, Biology, Advisor: Dr. Daniel Cristol
The Effect of Methylmercury on Immune Response to a Common Parasite in Zebra Finches

********Join Jessica as she presents her research Friday, March 22, 2013********
from 8:30am-9:30am in Tidewater B

The Arts & Sciences Graduate Studies Advisory Board at the College of William & Mary is a proud sponsor of the 2013 Graduate Research Symposium

The Graduate Studies Advisory Board is a group of educational, corporate, and community leaders with a commitment to enhancing the quality of graduate education in Arts & Sciences at William and Mary. We commend the attendees of the Graduate Research Symposium for their dedication to excellence in research.

The missions of the Graduate Studies Advisory Board are:

- Development/fundraising to increase graduate Arts & Sciences financial resources
- Assisting in the building of a graduate Arts & Sciences community
- Enhancing professional development opportunities for graduate students
- Advocating for graduate Arts & Sciences within the William and Mary community

Arts & Sciences graduate programs are critical to the mission of the College of William and Mary and to the College's status as a research university. Graduate programs strengthen the undergraduate program by providing research and mentoring opportunities, and are essential in retaining approximately a third of William and Mary's faculty members in Arts & Sciences.

By sponsoring the 2013 Graduate Research Symposium, initiating the Distinguished Thesis/ Dissertation Awards, the Carl J. Strikwerda Awards for Excellence and the S. Laurie Sanderson Awards for Excellence in Undergraduate Mentoring in Arts & Sciences, and providing recruitment fellowships to outstanding entering graduate students, the Graduate Studies Advisory Board is playing a vital role in advancing William and Mary's graduate programs in Arts & Sciences.

Members of the Graduate Studies Advisory Board, 2012-13

President: Cynthia Morton '77 BS Biology
Vice-President: Diane Alleva Cáceres '87 BA Economics, '89 MA Government
Past President: Larry McEnerney '76 BA English & History
Chair, Student Professional Development Committee: Robert Saunders '00 BS Physics
Chair, Development and Communications Committee: Bill Tropf '68 BS Physics

Debbie Allison '77 BS Chemistry
Patti Barry '63 BS Chemistry
John D. Burton '89 MA History, '96 PhD History
Kathryn Caggiano '90 BS Mathematics
Peter Martin '71 MS Physics, '72 PhD Physics
George Miller '67 BS Physics, '69 MS Physics, '72 PhD Physics
Brian J. Morra '78 BA History
Bradley (Lee) Roberts '70 MS Physics, '74 PhD Physics
Edwin Watson II '68 BA History, '70 MA History
Gail W. Wertz '66 BS Biology

The College of William & Mary
Award Recipients for Excellence in Scholarship

William & Mary Award for Excellence in the Humanities and Social Sciences

JAMES HILL
History, Advisor: Dr. Brett Rushforth
"My warriors are Victorious over the Americans in every quarter":
The Spanish-Creek Alliance and its Efforts to Combat the New Republic, 1784-1789

William & Mary Honorable Mentions

KATHRYN BENNETT
American Studies, Advisor: Dr. Elizabeth Barnes
"Ambiguity and Elegy: The New York Ledger and Abraham Lincoln"

MADELEINE GUNTER
Anthropology, Advisor: Dr. Martin Gallivan
Memorialization in Early Medieval Ireland: A Quantitative Study

Visiting Scholar Award for Excellence in the Humanities and Social Sciences

JONATHAN BARTH
History, George Mason University, Advisor: Dr. Cynthia Kierner
The Massachusetts Mint: A Study of Evolving Imperial Relations in the 17th Century

Visiting Scholar Honorable Mention

JONATHAN RENZ
Psychology, Radford University, Advisor: Dr. Jeffrey Aspelmeier
Adult Attachment Styles and Self Regulatory Resources: A Dynamic Interplay

The College of William & Mary
Award Recipients for Excellence in Scholarship

William & Mary Awards for Excellence in the Natural & Computational Sciences

WILLIAM ROACH
Applied Science, Advisor: Dr. R. Ale Lukaszew
Niobium Nitride Thin Films and Multilayers for Superconducting Radio Frequency Cavities

YUDISTIRA VIRGUS
Physics, Advisor: Dr. Henry Krakauer
Ab initio many-body study of cobalt adatoms adsorbed on graphene

William & Mary Honorable Mentions

HAO HAN
Computer Science, Advisor: Dr. Qun Li
DozyAP: Power-Efficient Wi-Fi Tethering

WEI WEI
Computer Science, Advisor: Dr. Qun Li
LBSNSim: A Trace-driven Model for Online Location-based Social Networks

Visiting Scholar Award for Excellence in the Natural & Computational Sciences

ERIN HELLER
Biological Sciences, Old Dominion University, Advisor: Dr. Eric Walters
The effects of urbanization on the relationship among birds, ticks, and tick-borne diseases

Visiting Scholar Honorable Mentions

SANDRA ADDO
Statistics, University of Georgia, Advisor: Dr. Jeongyoun Ahn
Multi-class Sparse LDA via Linear Programming

ANUSHA LIYANAGE
Physics, Hampton University, Advisor: Dr. Michael Kohl
Measurement of the Proton Electric to Magnetic Form Factor Ratio with Polarized Beam and Target

The College of William & Mary
Carl J. Strikwerda Awards for Excellence

These awards recognize W&M Arts & Sciences graduate students for an outstanding written paper by a student who is engaged in thesis research/scholarship to earn an MA, MS, or MPP degree. In the spring of 2011, the Arts & Sciences Graduate Studies Advisory Board voted unanimously in support of the Board's concept for initiating these annual awards. To be considered for an award, Graduate Research Symposium presenters had to submit a 5-6 page paper describing their research. The papers were judged blindly by an independent panel of William & Mary faculty and Graduate Studies Advisory Board members. Awardees are listed in alphabetical order.

Awards for Excellence in the Humanities and Social Sciences

HAYDEN BASSETT
Anthropology, MA/PhD, Advisor: Dr. Neil Norman
Subterranean Architecture in Early Virginia: An Analysis of Below-Ground Structures from Jamestown, Flowerdew Hundred, and Martin's Hundred

PATRICK HAMMETT
Psychology, MA, Advisor: Dr. Cheryl Dickter
E*vent-Related Potentials in Response to Smoking and Nonsmoking Cues Among Individuals with Previous Exposure to Parental Smoking*

Award for Excellence in the Natural and Computational Sciences

COURTNEY TURRIN
Biology, MS, Advisor: Dr. Bryan Watts
Effects of Intraspecific Interaction with Floaters on Breeding Bald Eagles in the Chesapeake Bay

The College of William & Mary
S. Laurie Sanderson Awards for Excellence in Undergraduate Mentoring

These awards recognize Arts & Sciences graduate students for outstanding undergraduate mentoring in scholarship and research outside of classroom teaching. Such mentoring includes graduate students who mentor undergraduates in the context of the undergraduate students' senior theses, honors theses, writing projects, term papers, or research in a laboratory, field site, museum, or archive. In the spring of 2009, the Arts & Sciences Graduate Studies Advisory Board and the Arts & Sciences Committee on Graduate Studies voted unanimously in support of the Board's concept for initiating and funding these annual awards.

Nominations consisted of supporting statements from current or past W&M undergraduate students and faculty members. A panel of W&M faculty and Graduate Studies Advisory Board members ranked the nominations. Awardees are listed in alphabetical order.

Awards for Excellence in Undergraduate Mentoring in the Humanities and Social Sciences

JESSICA HERLICH
Anthropology Department, PhD

KRISTIN ZAJO
Psychology Department, MS

Awards for Excellence in Undergraduate Mentoring in the Natural and Computational Sciences

WILLIAM CZAPLYSKI
Chemistry Department, MS

VALERIE TRIPP
Chemistry Department, MS

Friday Morning, March 22 Program Schedule

8:00 AM - 8:30 AM REGISTRATION (Second Floor Lobby)

8:30 AM - 9:30 AM CONCURRENT SESSIONS

Tidewater A	Tidewater B	James Room	York Room	Chesapeake C	Colony Room
Melissa Cummings Physics *College of William & Mary*	***Jessica Ebers** Biology *College of William & Mary*	***Sarah Stanford-McIntyre** American Studies *College of William & Mary*	**Amelia Butler** History *College of William & Mary*	**Patrick Johnson** Anthropology *College of William & Mary*	**Gregory Greer** English *George Mason Univ.*
***Anusha Liyanage** Physics *Hampton University*	**Natasha Hagemeyer** Ecology *Old Dominion University*	**Katherine Previti** American Studies *College of William & Mary*	***Jonathan Barth** History *George Mason University*	**Kristen Beales** History *College of William & Mary*	**David Newman** Psychology *College of William & Mary*
Joshua Devan Physics *College of William & Mary*	**Margaret Whitney** Biology *College of William & Mary*		**Molly Perry** History *College of William & Mary*	**Marc Thomas** History *Virginia Tech*	**Cristina Reitz-Krueger** Psychology *University of Virginia*
Leonidas Aliaga Soplin Physics *College of William & Mary*	**Jessica Spickler** Biology *College of William & Mary*	**** indicates award winner***			

9:45 AM - 10:45 AM CONCURRENT SESSIONS

Tidewater A	Tidewater B	James Room	York Room	Chesapeake C	Colony Room
Benjamin Rislow Physics *College of William & Mary*	***William Roach** Applied Science *College of William & Mary*	**Jaymi Thomas** English *Marymount University*	**Jenna Carlson** Anthropology *College of William & Mary*	***James Hill** History *College of William & Mary*	**Bradley Spiers** Music *Tufts University*
Mary Mohr Physics *College of William & Mary*	**Kaida Yang** Applied Science *College of William & Mary*	**Stephanie Maguire** American Studies *College of William & Mary*	**Sarah Mattes** Anthropology *College of William & Mary*	**Ian Tonat** History *College of William & Mary*	**Kevin Cavanagh** Psychology *College of William & Mary*
Guangzhi Qu Physics *College of William & Mary*	**Du Shen** Applied Science *College of William & Mary*	**Alyce Sustko** Literature & Language *Marymount University*	**Konrad Antczak** Anthropology *College of William & Mary*	**Jenna Simpson** American Studies *College of William & Mary*	**Todd Warner** Psychology *University of Virginia*
	Eric Dieckman Applied Science *College of William & Mary*				

10:55 AM - 11:55 AM CONCURRENT SESSIONS

James Room	**Amanda Johnson** Anthropology *College of William & Mary*	***Madeleine Gunter** Anthropology *College of William & Mary*	**Christian Wilbers** American Studies *College of William & Mary*
York Room	**Ellen Chapman** Anthropology *College of William & Mary*	**Laura Masur** Anthropology *College of William & Mary*	

11:00 AM - 12:00 PM POSTER PRESENTATIONS (Second Floor Lobby)

1) Andrew Beaupre (Anthropology) *College of William & Mary*	**5) Bishoy Dongwi** (Physics) *Hampton University*	**9) Vitek Jirinec** (Biology) *College of William & Mary*	**13) Gregory Shuler** (Psychology) *College of William & Mary*
2) Sarah Borowski (Psychology) *College of William & Mary*	**6) Charles Fancher** (Physics) *College of William & Mary*	**10) Ivy Krystal Jones** (Physics) *Hampton University*	**14) Christopher Uyehara** (Biology) *College of William & Mary*
3) Adrian Bravo (Psychology) *Old Dominion University*	**7) Anna Harris** (Psychology) *College of William & Mary*	**11) Kaila Margrey** (Chemistry) *College of William & Mary*	**15) Zhen Xing** (Physics) *College of William & Mary*
4) John Dombrowski (Psychology) *College of William & Mary*	**8) Lauren Hurst** (Biology) *College of William & Mary*	**12) Ekaterina Mastropas** (Physics) *College of William & Mary*	**16) Mi Zhang** (Physics) *College of William & Mary*

Friday Afternoon, March 22 Program Schedule

12:00 PM - 1:00 PM LUNCH (Chesapeake A)

1:00 PM - 2:00 PM CONCURRENT SESSIONS

Tidewater A	Tidewater B	James Room	York Room	Chesapeake C	Colony Room
Peng Xu Physics *College of William & Mary*	**Lauren Rusnak** Biology *College of William & Mary*	***Kathryn Bennett** American Studies *College of William & Mary*		***Hao Han** Computer Science *College of William & Mary*	**James Crawford** English *VCU*
Jie Yang Applied Science *College of William & Mary*	**Elizabeth Kudirka** Forensic Science *Towson University*	**Alexandra Méav Jerome** American Studies *College of William & Mary*		**Matthew SeGall** Computer Science Appalachian State Univ.	**Jaclyn Petruzzelli** Public Policy *College of William & Mary*
Laura Rickard Applied Science *College of William & Mary*	**Maria Traver** Molecular Genetics & Microbiology *Duke University*			**Edmund Novak** Computer Science *College of William & Mary*	**Anthony Johns** Social Science *Towson University*
***Yudistira Virgus** Physics *College of William & Mary*	**Sean Koebley** Applied Science *College of William & Mary*				

**** indicates award winner***

2:15 PM - 3:15 PM CONCURRENT SESSIONS

Tidewater A	Tidewater B	James Room	York Room	Chesapeake C (2:15-3:30)
Travis Horrom Physics *College of William & Mary*	***Sandra Addo** Statistics *University of Georgia*	**Julia Kaziewicz** American Studies *College of William & Mary*	**Shannon Browning-Mullis** History *Georgia Southern Univ.*	***Wei Wei** Computer Science *College of William & Mary*
Megan Ivory Physics *College of William & Mary*	**Shadrack Antwi** Applied Science *College of William & Mary*	**Martinelle Allen** English *Marymount University*	**Brittany Brown** Anthropology *College of William & Mary*	**Feng Yan** Computer Science *College of William & Mary*
Tommy Byrd Physics *College of William & Mary*	**Xiao Wang** Applied Science *College of William & Mary*	**Shaun Richards** American Studies *College of William & Mary*	**Kimberly Knipe** History *Georgia Southern Univ.*	**Craig Sharp** Computer Science *College of Charleston*
Austin Ziltz Physics				**Ahmad Ghadiri** Computer Science
				Lei Lu Computer Science *College of William & Mary*

3:30 PM—5:00 PM COHEN CAREER CENTER PROFESSIONAL DEVELOPMENT WORKSHOP

MOCK JOB INTERVIEWS

• MOCK ACADEMIC POSITION INTERVIEW
•MOCK MUSEUM-TRACK INTERVIEW

Each interview will be followed with time for audience Q&A.
This is a fantastic opportunity to get a glimpse into the interview process, and to find out what might be expected of you in your next interview!

5:00 PM - 6:00 PM EVENING NETWORKING RECEPTION (Cohen Career Center—Roof Top Terrace)
JOIN GRADUATE STUDENTS, FACULTY AND GRADUATE STUDIES ADVISORY BOARD MEMBERS
Hors D'oeuvres and Refreshments will be served.

Saturday Morning, March 23 Program Schedule

8:00 AM - 8:30 AM REGISTRATION (Second Floor Lobby)

8:30 AM - 9:30 AM CONCURRENT SESSIONS

Tidewater A	Tidewater B	James Room (8:30-9:50)	York Room (8:30-10:10)	Chesapeake C	Colony Room
Joshua Hoskins Physics *College of William & Mary*	***Erin Heller** Biological Sciences *Old Dominion University*	**Derek Miller** Anthropology *College of William & Mary*	**Amanda Stuckey** American Studies *College of William & Mary*	**Raymond LaRochelle** Mathematics *American University*	**Dhymsy Vixamar-Owens** Psychology *Virginia State University*
Ji Liu Physics *College of William & Mary*	**Monique Bennett** Biology *College of William & Mary*	**Jeffrey Levin** History *American University*	**Lindsay Fitzpatrick** Women's Studies *Towson University*	**Jesse Laeuchli** Computer Science *College of William & Mary*	***Patrick Hammett** Psychology *College of William & Mary*
Douglas Beringer Physics *College of William & Mary*	**Ashley Hayes** Biology *UNC – Wilmington*	**Ashley Irizarry** History *College of William & Mary*	**Murray Ellison** English *VCU*	**Luke Rice** Computer Science *Appalachian State Univ.*	**Amanda Day** Anthropology *Georgia State University*
Martin Rodriguez-Vega Physics *College of William & Mary*	**Kate Bradwell** Life Sciences *VCU*	**Maxwell Werner** Anthropology *College of William & Mary*	**Anna Fowler** History *Virginia Tech*	**Xin Qi** Computer Science *College of William & Mary*	
	**** indicates award winner***		**Kevin Kosanovich** American Studies *College of William & Mary*		

9:40 AM - 10:40 AM CONCURRENT SESSIONS

Tidewater A	Tidewater B
James Dowd Physics *College of William & Mary*	***Courtney Turrin** Biology *College of William & Mary*
Valerie Gray Physics *College of William & Mary*	**Anna Brownson** Biology *Old Dominion University*
Joshua Magee Physics *College of William & Mary*	**Robert Isdell, III** Biology *College of William & Mary*
Juan Carlos Cornejo Physics *College of William & Mary*	**Ghazi Mahjoub** Biology *College of William & Mary*

10:50 AM - 11:50 AM CONCURRENT SESSIONS

Tidewater A	York Room
Tyler Huffman Physics *College of William & Mary*	**Frank Fucile** American Studies *College of William & Mary*
Eric Kumi Barimah Physics *Hampton University*	**Giny Cheong** History *George Mason University*
Elizabeth Radue Physics *College of William & Mary*	**Shuting Zeng** American Studies *College of William & Mary*
Lei Wang Physics *College of William & Mary*	

Saturday Morning, March 23 Program Schedule

11:00 AM - 12:00 PM POSTER PRESENTATIONS (Second Floor Lobby)

***indicates award winner**

1) *Hayden Bassett
(Anthropology)
College of William & Mary

2) Devin Braun
(Public Policy)
College of William & Mary

3) Zachary Brown
(Physics)
College of William & Mary

4) *William Czaplyski
(Chemistry)
College of William & Mary

5) Mark Guillotte
(Biology)
College of William & Mary

6) Jamie Klein
(Psychology)
College of William & Mary

7) Ralitsa Maduro
(Psychology)
Old Dominion University

8) Ian Mahoney
(Public Policy)
College of William & Mary

9) Emily Oettinger
(Psychology)
Old Dominion University

10) Jessica Pouder
(Biology)
College of William & Mary

11) Melissa Proffitt
(Biology)
College of William & Mary

12) *Jonathan Renz
(Psychology)
Radford University

13) Gleb Romanov
(Physics)
College of William & Mary

14) Matt Simons
(Physics)
College of William & Mary

15) *Valerie Tripp
(Chemistry)
College of William & Mary

16) Lisa Ulmer
(Psychology)
VCU

17) Andrea Williams
(History)
College of William & Mary

18) Joy Wyckoff
(Psychology)
College of William & Mary

19) *Kristin Zajo
(Psychology)
College of William & Mary

12:00 PM - 1:30 PM LUNCHEON & AWARDS CEREMONY (Chesapeake A)

Dr. John Swaddle *Dean of Graduate Studies and Research, Arts & Sciences, College of William & Mary*
Dr. Kate Conley *Dean of Arts & Sciences, College of William & Mary*
Dr. Michael R. Halleran, *Provost of the College of William & Mary*
President W. Taylor Reveley, III, *President of the College of William & Mary*

Congratulations to all of the award winners for the 12th Annual Graduate Research Symposium
(Awardees are listed in alphabetical order)

SANDRA ADDO
JONATHAN BARTH
HAYDEN BASSETT
KATHRYN BENNETT
WILLIAM CZAPLYSKI
JESSICA EBERS
MADELEINE GUNTER
PATRICK HAMMETT
HAO HAN
ERIN HELLER
JESSICA HERLICH
JAMES HILL
ANUSHA LIYANAGE
JONATHAN RENZ
WILLIAM ROACH
SARAH STANFORD-MCINTYRE
VALERIE TRIPP
COURTNEY TURRIN
WEI WEI
YUDISTIRA VIRGUS
KRISTIN ZAJO

CAREER DEVELOPMENT OPPORTUNITIES FOR GRADUATE STUDENTS DURING THE GRADUATE RESEARCH SYMPOSIUM

MOCK JOB INTERVIEWS

Friday, March 22 from 3:30 - 5:00 PM

Presentation Room - Cohen Career Center

Immediately following please join us for a Networking Reception on the Roof Top Terrace

- **MOCK ACADEMIC POSITION INTERVIEW**
- **MOCK MUSEUM-TRACK INTERVIEW**

Each interview will be followed with time for audience Q&A. This is a fantastic opportunity to get a glimpse into the interview process, and to find out what might be expected of you in your next interview!

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Another Brick in the Wall: How Misrecognitions Lead to the Creation of a Psychological Prison in Patricia Highsmith's *Strangers on a Train*

Presenter: Martinelle Allen
Advisor: Tonya-Marie Howe
Marymount University,
English

In Patricia Highsmith's 1950 psychological novel, *Strangers on a Train*, Charles Anthony Bruno's proposal to swap murders presents Guy Haines with an opportunity to obtain freedom because it will allow him to get out of the loveless and unhappy marriage he is in with his wife, Miriam. Unfortunately, Guy fails to recognize the consequences of his unspoken complicity. Once he gives into Bruno's plan, Guy encounters a series of misrecognitions that motivate Guy into constructing a psychological prison to avoid his growing feelings of guilt. This paper demonstrates that Guy's psychological prison does not provide him with the liberation that he so desperately seeks and instead, his prison becomes an instrument of suppression. Guy reaches a point where he must finally admit the truth: that he—not Bruno—is responsible for his lack of freedom, and it is with this admission that causes the prison to collapse. Guy's failed attempt at avoiding guilt and responsibility is a cautionary tale of how ignoring one's true relationship with reality, or the part that one plays in creating chaos in their life, can inevitably backfire and cause consequences on one's mental and physical being.

Ambiguity and Elegy: *The New York Ledger* and Abraham Lincoln

Presenter: Kathryn Bennett
Advisor: Elizabeth Barnes
College of William & Mary,
American Studies

The New York Ledger was the most popular periodical in the United States during the Civil War, yet it remains largely absent from current scholarship. In this presentation, I will consider the paper's complicated attitude toward the 16th president, arguing that while the Ledger contributed to the hagiography of Abraham Lincoln during his presidency, its overwhelming attitude was antipathy. I will consider how the paper's rhetoric before the war parallels, perhaps influencing, that of Lincoln's First Inaugural. Later, the Ledger's opposition to Lincoln sprang from the perceived negative impact of the Union blockade on commerce, which in turn left the paper unable to adequately address the (extra commercial) outpouring of grief following his assassination, reflecting concerns about the man and his legacy. The ambiguity and elegy that undergird the Ledger's coverage of Lincoln, as bound up as they are with the paper's attitude toward commerce, reflect the stated (contradictory?) aims to be both financially successful and yet deny commercial motivation. The uneasy collusion of the market and the sentimental delineated by the coverage of Lincoln represent the paper's attempt to bridge the gap between merchant and industrial capitalism.

Evaluating E. A. Poe's *Eureka* After His Death

Presenter: Murray Ellison
Advisor: Marcel Cornis-Pope
Virginia Commonwealth University,
English

Edgar Allan Poe believed that his book, *Eureka: a Prose Poem* (1848), would produce revelations that would be "of greater importance than Newton's discovery of gravitation. In *Eureka*, Poe offered theories on the origins, operation, and future of the Universe. He applied discoveries from some of the greatest thinkers in history, as well as those from his own research, to advance his own significant conclusions. He anticipated the "Big Bang Theory," and "Relativity," which have long been accepted by most modern day scientists. Despite Poe's bold claim, and his important discoveries, *Eureka* has been ignored by critics until the recent era. However, he asked that his work not be judged until after he died. The most significant challenge for the modern researcher has been to determine how to judge Poe's genre bending work. Many who have tried have become frustrated and failed. One critic noted that the book was too literary for science and too scientific for literature. The present study shall assess both the literary and scientific value of *Eureka* by utilizing critical literary, and scientific research, as well as non-traditional creative nonfiction investigation techniques "guided" by Poe's fictional Detective, C. Auguste Dupin. I am positing that literary critics and scientists have undervalued *Eureka: a Prose Poem* because they have not been able to fit the work into any familiar category. I shall attempt to discuss the value of Poe's work for present day literary critics, serious scientists, as well as for interested readers of classic American literature.

Housewives and Real Lives: The Negative Aspiration Model of *The Real Housewives of Atlanta*

Presenter: Lindsay Fitzpatrick
Advisor: Rita Marihno
Towson University,
Women's Studies

The enormous popularity of female-cast reality television warrants an examination of the programs' messages for young female viewers. The most popular incarnation of Bravo's *Real Housewives* franchise is their Atlanta series which follows the lives of six Georgia women. A content analysis of the series was conducted to examine the messages of the show. Episodes were analyzed. These episodes contained anti-feminist messages about women and the cast members' "work" and were rarely shown in a professional context. Materialism and the derivation of status from financial wealth was another prevalent theme and illustrated a decided disconnect between hard work and financial gain. Finally, aggressive and uncooperative behavior in female-to-female interactions and relationships was a recurrent thread. These factors converge to create a "negative aspiration model" which is defined an anti-feminist model for young women. This negative model emphasizes materialism and aggression while de-emphasizing professional growth and education. *The Real Housewives of Atlanta* glamorizes archaic ideas about women and their role in society, insisting on aggressive competition between women for men and monetary resources. Given the program's popularity, its influence cannot be understated. The negative aspiration model created by *The Real Housewives of Atlanta* has the potential to dismantle many fundamental gains of the Women's Movement.

Zones of Obliteration and Preservation: Aerial and Landscape Photography in the Second World War

Presenter: Frank Fucile
Advisor: Alan Braddock
College of William & Mary,
American Studies

While photographic systems during the First World War were regulated through highly restrictive censorship rubrics, the relationship of military and journalistic photography in the Second World War was substantially more integrated, as photographic pools and propaganda strategies led to an active exchange of information between the U.S. military and civilian journalists. This interrelationship is perhaps most explicit in *National Geographic Magazine*'s coverage of the war, which frequently incorporated discussions of technological, photographic, and tactical substance into its articles, often appropriating military aerial photography and even publishing text written by military officers. What were the differences between the military and journalistic uses of aerial photographs? How did different representations of the landscape relate the environment to military strategy? How did the potential for ecological and architectural obliteration allow for narratives of preservation to be used as propaganda? This paper compares readings of magazine articles and tactical bombing reports as studies of the integration of photographic, technological, reportorial, agricultural, and propaganda systems in civilian and military contexts. Aerial photographs were used to plan and document missions but also to demonstrate power and moral superiority to civilian audiences. While many areas and ecosystems were subject to absolute destruction in the Second World War, the U.S. military treated certain structures and agricultural systems as privileged environments which were preserved and integrated into positive representations of the war rather than being obliterated or exploited.

Mr. Jefferson's *Qur'an*: How Islam's Holy Book and the *Constitution of Medina* Influenced the Founding of the United States

Presenter: Alexandra Méav Jerome
Advisor: Tamara Sonn
College of William & Mary,
American Studies

On December 9th, 1805, Thomas Jefferson hosted the nation's first *iftar* at the White House. It was an unplanned event, one that occurred as a result of Jefferson's hosting of a Tunisian envoy at the conclusion of the First Barbary War. Upon hearing of his visitor's fasting for the month of Ramadan, Jefferson changed the daily mealtime to "precisely at sunset" to accommodate his guest. This was not Jefferson's first encounter with Islam, while a law student at William & Mary, he purchased George Sale's translation of the *Qur'an* and studied Arabic. Although he rarely spoke on the topic of religion and did not leave us with any written record of his actual opinion of Islam, we can glean from Jefferson's crafting of the Declaration of Independence and the Constitution, as well as his diplomatic gestures with the Barbary states, is that he was not only sympathetic to Islam, but also influenced by the moral and humanitarian elements of Islam. The *Qur'an* and the Constitution of Medina, both texts that are integral to the formation and governance of Islamic societies influenced Jefferson's shaping of the Declaration of Independence and the Constitution. The founders of America knew about Islam and it, as much as Humanism, Deism or Christianity, served as a moral and political guidepost in the early, formative days of the Republic.

The Mad Man in *The Gray Flannel Suit*

Presenter: Julia Kaziewicz
Advisor: Susan Donaldson
College of William & Mary,
American Studies

The depiction of mental health and mental illness in 20th century popular culture often mirrors societal attitudes about what many consider a taboo subject. In 1955, World War II veteran Sloan Wilson published *The Man in the Gray Flannel Suit*, a novel that probes American attitudes about mental health. The novel questions the ability of a man much like Wilson, war vet Tom Rath, to reintegrate into consumer-based post war American society. While the novel centers on Tom Rath's struggle with his war experiences, *The Man in the Gray Flannel Suit* also questions the mental health of Tom Rath's wife, Betsy Rath. This paper will show how *The Man in the Gray Flannel Suit* exposes the mental health struggles of both suburban women and working men in 1950s America through an examination of the novel's two main characters. It is clear that Betsy Rath suffers from her own version of the feminine mystique, yet she is the mastermind behind plans to save her family from financial and emotional ruin. How is it that Wilson is able to portray Betsy Rath as both a capable business woman and a hysterical housewife? Tom Rath's inability to suppress his war-time memories, despite his insistence that he no longer thinks about his army days, calls into questions his ability to adapt to life in peacetime. Understanding the contradictions between Tom and Betsy's thoughts and actions will give us a clearer picture of what it meant to struggle with mental health at mid-century.

Just Be Real: Buddy Esquire and Advertising Hip-Hop Authenticity to the Bronx and Beyond

Presenter: Kevin Kosanovich
Advisor: Charles McGovern
College of William & Mary,
American Studies

Emerging hip-hop culture created new modes of communication through flyer advertising demanding a critical reappraisal of the discursive narrative of "abandonment" and "isolation" of 1970s' Bronx. As the number of DJs and MCs hosting parties in the Bronx and Harlem increased throughout the 1970s, the need to advertise these parties increased. Although parties still relied on the recreation rooms and community centers of hip-hop's initial emergence as sites for weekend parties, by the late 1970s private clubs and venues in the Bronx and Harlem increasingly allowed the newest DJs and MCs to capitalize on the burgeoning youth culture as its participants grew into young adulthood. With an increase in DJs and MCs to choose from, attracting a divided audience's attention, or expanding the size of the audience—demanded a new mode of hip-hop communication. Developing a unique form of cultural expression rooted in hip-hop's cultural aesthetic, hip-hop flyers advertised to an increasingly geographically disparate audience. Buddy Esquire and his flyer artist peers creative output between 1977-1983 provided a critical purchase to understand the seeming contradictions of advertising hip-hop's authenticity. Buddy Esquire's flyer art provided a bridge between hip-hop's Bronx emergence in 1973 and expansion into the culture industries by 1983. Not only did the flyers and flyer artists represent and advertise hip-hop parties, this new mode of communication helped define, and re-define, hip-hop style and shape, and re-shape, its geography revealing a more expansive and interconnected youthful urban culture than discussed by previous scholarship.

Navigating the Color Line: Complications of Race in *The Marrow of Tradition*

Presenter: Stephanie Maguire
Advisor: Susan Donaldson
College of William & Mary,
American Studies

This paper explores the complexity behind racially distinguishing characters in Charles Chesnutt's 1901 novel *The Marrow of Tradition*. In a fictionalized account of the 1898 Wilmington race riot, Chesnutt challenges conventions of his time that suggested skin color was the ultimate qualifier of individuals. He does this by featuring characters who do not fit neatly into categories of African American or white. Instead, his characters are products of mixed races, mixed classes, and mixed behaviors. Their heritage, professions, and habits all contribute to who they are in the novel, and each character further represents the predicament of defining people solely on the color of their skin. Aside from presenting the obvious problems of visible racial identifiers and encouraging the reader to recognize the caveats behind them, I suggest that Chesnutt also implicates the reader by incorporating racial stereotypes into his novel. By exaggerating certain expectations that a reader may have, he subtly forces the reader to question the validity of categorizing characters in any sense. This indicates Chesnutt's belief that there is ultimately no way to perfectly characterize individuals, nor will there ever be. While Chesnutt possesses clear skill in exposing the problems of racially defining people, he fails to offer a solution to such a problem. Still, both his fiction and the act of writing the novel are daring ways to demonstrate the need for questioning the standard paradigms of racial classification.

Blackened White Pillars: The Architecture of Race and Family in *Birth of a Nation*

Presenter: Kate Previti
Advisor: Susan Donaldson
College of William & Mary,
American Studies

D.W. Griffith's groundbreaking Civil War film *Birth of a Nation* (1915) begins in the antebellum era and chronicles the events spanning the war and Reconstruction and offers an unabashed justification and rallying cry for vigilante violence of organizations like the Ku Klux Klan. The film is an ode to the Old South and a celebration of a Southern distinctiveness anchored in white supremacy. The film's construction of a nationalized southernness built on white supremacy and demonized black bodies has been the subject of much film, historical, and American Studies scholarship. This paper examines the ways in which the film's construction of racialized southernness also operates through architecture and social spaces, namely the southern porch. In *Birth of a Nation*, the porch becomes an emblematic sight of the southern social landscape and a stage for performative displays of a harmonious antebellum racial hierarchy. The tranquility of the antebellum porch depicted in the film provides a marked contrast to its Reconstruction scenes showing unruly mobs and black on white violence. As depicted in *Birth of a Nation*, the whiteness of the antebellum southern porch is among the things that were "tragically" lost. While more violent than later films celebrating the Old South like *Gone with the Wind* (1939), *Birth of a Nation* popularized Lost Cause sentiment on the national stage and used the distinctly southern iconography of the porch to render the Old South's racial order tranquil and preferable to that offered by Reconstruction.

Faulkner's Knights Errant: Male Mental Disability and White Southern Womanhood

Presenter: Shaun F. Richards
Advisor: Susan Donaldson
College of William & Mary,
American Studies

Men with mental disabilities are emasculated because of a perceived lack that prevents them from fulfilling traditional standards of hegemonic masculinity, particularly those of reason and self-control. Stereotyped as innocent, vulnerable, and dependent, these men represent non-normative masculinity, meaning that they are oppressed according to a binary logic of mind and body. And yet, disabled men pose a dual-threat because they are viewed as both asexual and hypersexual. At the same time, the "retarded" character is a literary convention employed to demarcate the humanity—or lack thereof—of "able-minded" characters by virtue of the objectivity implied by their limited intellectual abilities and outsider status. Disability thus serves an ethical as well as metaphorical function for questioning social norms about gender. This paper argues that the characters of Benjy Compson from *The Sound and the Fury* and Tommy from *Sanctuary* operate to criticize New Southern masculinity. I contend that Faulkner uses male mental disability to better understand and challenge patriarchal assumptions about not only the supposed dangers posed to white women, but also the position of white males as guardians of white female sexuality: The "idiot" Benjy is the only Compson male who exhibits compassion for sister Caddy after they learn of her sexual promiscuity and infidelity; and Tommy, a feebleminded African American, is murdered by a fellow moonshiner while protecting a kidnapped girl from sexual assault. In both cases the intersection of masculinity studies, literary criticism, and disability studies allows for readings that reformulate perceptions of (dis)abled masculinities.

Living History Where Cultures Meet: Native American Voices at Plymouth and Williamsburg

Presenter: Jenna Simpson
Advisor: Arthur Knight
College of William & Mary,
American Studies

At the living history museums of Plimoth Plantation and Colonial Williamsburg, visitors are invited to step into America's colonial past and experience firsthand the lives of the settlers. However, the Europeans who established new homes in Massachusetts and Virginia certainly did not find themselves in an uninhabited frontier; rather, they had to learn to live side-by-side with the indigenous people who had called America home for generations. This presentation explores the ways in which 20th and 21st century commemorations of the early history of Plymouth and Williamsburg have addressed those colonial encounters. Looking at the planning and execution of historical pageants, community celebrations, and institutionalized living history, I will ask to what degree the voices of Native Americans have been represented and how these representations have changed. Using both historical documents and interviews with people currently working with Plimoth Plantation's Wampanoag program and Colonial Williamsburg's American Indian Initiative, this presentation will consider the different ways European and Native American histories are interpreted and presented at these leading living history sites, and will demonstrate some of the changes in that interpretation over the past several decades.

"The First Fruits of the New Age," Grain Elevators in the American Landscape

Presenter: Sarah Stanford-McIntyre
Advisor: Arthur Knight
College of William & Mary,
American Studies

Grain elevators are a ubiquitous part of the rural American landscape. Especially in the Plains states, elevators are a tall and imposing presence that dominates the surrounding treeless countryside. Focusing on this visual significance, I explore both the history of the grain elevator, as well as its cultural and artistic importance. Popular conceptions of the grain elevator are intimately associated to American iconography and cultural memory, invoking nostalgia for the yeoman farmer and a prosperous, self-sufficient rural America. However, further exploration reveals the truly fraught relationship between the grain elevator, local populations, and cultural memory. Grain elevators are heavily implicated in an international agribusiness community that has destructive consequences for local landscapes as well as the communities that inhabit them. I argue that visual interpretations of grain elevators are linked to this dichotomy, alternately conceptualized as part of the natural landscape or as emblematic of an unnatural, human presence. With this study, I wed analysis of cultural and aesthetic memory to the history of regional agriculture and commerce to better understand the relationship between grain elevators, American culture, and the land itself.

"The City that Reads": Poe, *The Wire,* and Detective Fiction

Presenter: Amanda Stuckey
Advisor: Karin Wulf
College of William & Mary,
American Studies

Credited for his influence on the genre of detective fiction, Edgar Allan Poe spent his early career in Baltimore, a city that, in another century and through another medium, the HBO police procedural *The Wire* portrays as ripe for the kind of detective work that C. Auguste Dupin might have done in "The Murders in the Rue Morgue." Indeed, critics of the television show often note the storylines' literary and almost novelistic details, details that unfold as detectives follow leads throughout the city. Despite obvious differences in the medium, setting, and circumstances of Poe's detective fiction and of *The Wire,* I am interested in what the 21st century adaptation of the detective genre reveals about the relationship between race, place, and in Poe's own words, detective "tales of ratiocination." Baltimore, a contact zone between north and south, land and sea, offers a point of entry into a conversation about Poe's work and *The Wire*. Even though the settings of Poe's detective stories are far removed from the streets of Baltimore, critics have noted the city's influence on Poe's writing and its impact on the oblique workings of race in his fiction. This paper asks how the conventional plot of detective fiction – a plot that develops according to acts of reasoning and deduction – constitutes a racialized way of thinking and of navigating Baltimore's volatile racial landscape.

Tragic No Longer: Reclaiming the *Mulatta*

Presenter: Alyce Sustko
Advisor: Leigh Johnson
Marymount University,
Literature, Language and the Humanities

Charles Chesnutt both adheres to and deviates from the tragic *mulatta* tradition in his novels *Mandy Oxendine* and *The House Behind the Cedars*. Chesnutt's *mulatta* in both of these novels deconstructs racial boundaries and threatens the white dream of racial purity through the subtle use of shadow narrative. In using the shadow narrative of the white masculine gaze, which sexualizes and objectifies the *mulatta* figure, Chesnutt exposes the sexual weakness of the white male and empowers the *mulatta* to become an active figure of subversion rather than a passive figure of tragedy. While on the surface, Rena appears to follow the tragic *mulatta* trope much more closely than Mandy, the underlying shadow narrative present throughout the text undermines it. For example, Rena changes a wealthy white Southern man's perceptions of race, which is highly subversive. Mandy, on the other hand, inspires no real change. Although the men are punished for their sexual attraction to her, Mandy returns to her *mulatta* identity and everything returns to the way it was. Critics often view Mandy Oxendine as the more inflammatory of the two novels, yet Rena from *The House Behind the Cedars* inspires real social change, making her the most dangerous *mulatta* figure of all. This challenges the stereotype of the tragic *mulatta*, reclaiming her as a figure symbolizing resistance rather than a tragic acceptance, while at the same time challenging the scholarship regarding Chesnutt's use of the *mulatta* figure in both of these novels.

Exploring Body Consciousness in Zora Neale Hurston's *Color Struck* and Neil LaBute's *Fat Pig*

Presenter: Jaymi Thomas
Advisor: Marguerite Rippy
Marymount University,
Literature, Language and the Humanities

In this thesis project, I will research Zora Neale Hurston's play, *Color Struck* and Neil LaBute's play, *Fat Pig*, in light of the fact that these works were created by authors with completely different backgrounds, I will address the ways in which both authors discuss body-consciousness, body image, and how people engage with societal views of color and weight. The heart of the research centers on issues concerning the lack of intimacy between the main characters in both plays because of their fears that they will be repulsed and rejected by society. Both men claim to love the "other"—that in this thesis, is the "other" form of beauty and attraction, in one play embodied by the overweight woman and in the other by the woman with dark skin. Both of these women live outside the realm of society's conventional standards of beauty, and the lens that they view their worlds through are altered because of the public gaze devaluing their bodies.

Deutsche Arbeit, the American Way: Class and Belonging in German America, 1919-1939

Presenter: Christian Wilbers
Advisor: Charles McGovern
College of William & Mary,
American Studies

During the interwar period, the trope of *Deutsche Arbeit*, "German Work," perpetuated a myth about the exceptional qualities of German labor at home and abroad. Deemed industrious, diligent, efficient, and reliable, the working class became one of the flagships of German nationalism after World War I. The desire among some German-Americans to express that heritage publicly, however, was met with resistance in the United States. Americans eager to shake off "hyphenated" immigrant culture often reacted viciously against such aggressive displays of a foreign creed. My paper analyzes how such conflicts shaped immigrants' negotiations of their hyphenated identities. Utilizing a variety of archival resources as well as a number of letters written by German-Americans, I suggest that German immigrant culture in the United States continued to be highly invested in the politics of the homeland and that contemporary events in Germany did much to shape the ways in which they responded to simultaneous events in *Amerika.*

Edward Burtynsky: Photography, Film, and the Politics of Nature

Presenter: Shuting Zeng
Advisor: Alan Braddock
College of William & Mary,
American Studies

Edward Burtynsky's photography series *Manufactured Landscapes* presents the sceneries of industrial manufacturing such as oil refining, quarries and tailings, and also sets locations like China and Australia as thematic presentations. What makes Burtynsky's photography controversial is the way he frames the industrial manufacturing which people associate with environmental hazards into large-scale artistic photos echoing the 19th century landscape paintings which meet people's aesthetic satisfaction. My paper challenges some recent interpretations of *Manufactured Landscapes* that regard Burtynsky's photography as decontextualized and politically unconscious or incorrect. This paper will then provide an alternative reading of Burtynsky's photos of China, a subject of key importance to his stated thematic goal of capturing "large-scale", "nature and industry", and "globalization". Edward Burtynsky aims for his audience to have a "forbidden pleasure" in viewing his depictions of massive environmental transformation wrought by human beings, thereby reinventing traditional landscape aesthetics of the sublime in secular postmodern terms. It is this disputable "forbidden pleasure" that interests me and will be my focus.

Bibulous Sailors and Colorful Little Bowls: The Role of English Delftware Punchbowls on La Tortuga Island, Venezuela

Presenter: Konrad Antczak
Advisor: Frederick Smith
College of William and Mary, Anthropology

Dozens of small English delftware punchbowls were recovered at the Punta Salinas archaeological site on the island of La Tortuga, Venezuela. The bowls, found alongside a large assemblage of ceramics, glass and other artifacts were left by New England sailors who exploited La Tortuga's saltpans during the 18th century. This paper aims at disclosing the roles these punchbowls played among the sailors who were arriving seasonally at this Spanish island located on the periphery of the Atlantic World. Through a judicious juxtaposing of the archaeological evidence and historical documents, the results of the research suggest that the punchbowls were central to the negotiation of social status and the fostering of social relations among the Anglo-American sea captains. The uninhabited and peripheral, and thus ideationally ambiguous and unordered La Tortuga required the recreation there of the ubiquitous 'tavern' that the sea captains were accustomed to frequent in all major Atlantic ports. Moreover, the punch and punchbowls that the captains drank and used while on the island were not only central to the negotiation of social status and relations. More transcendentally, the materiality of punch and punchbowls was evocative of the captain's role in the burgeoning Atlantic World economy. The exotic ingredients of punch and the fashionable punchbowls brought from the far-reaches of the Anglo-American capitalist sphere of influence were consumed by sea captains—the very agents of the new economic world system.

Subterranean Architecture in Early Virginia: An Analysis of Below-Ground Structures from Jamestown, Flowerdew Hundred, and Martin's Hundred

Presenter: Hayden Bassett
Advisor: Neil Norman
College of William and Mary, Anthropology

The Chesapeake region of Virginia plays one of the more significant roles in the European colonization of British America. Environmental considerations have increasingly been seen as having greater implications in the spread of European settlement, agricultural patterns in land use, and Euro-American responses tied to place. In this study, I will look at several of the environmental considerations of the European settlement of Tidewater, Virginia in the early-17th century, and specifically addressing the architectural response to climate. This research uses fluid dynamics – through modern-day building performance software – to assess "subterranean architecture" in the first-quarter of the 17th century Virginia. The conscious decision to build below-ground – utilizing negative space – is what I hypothesize to be just one of several responses to the mid-Atlantic climate during in the British colonization of the New World. This will be demonstrated through three cases: a structure from Martin's Hundred, the bake oven from Flowerdew Hundred, and the early oven structure from Jamestown. In so doing, it is my intention to explore methodologies that might open doors to new types of questions within a new conception of "Buildings Archaeology" on this side of the Atlantic. These negotiated responses to climate represent just one of a series of new potential questions. I also explore this as one way that archaeology can contribute to modern issues; specifically, reclaiming historic passive design (optimized to specific regional climates) to both inform today's sustainable designers and contribute to our knowledge of the past in meaningful ways.

Paddling Through the Past: A 'Waterscape' Archaeological Survey of the Champlain Valley

Presenter: Andrew Beaupre
Advisor: Martin Gallivan
College of William and Mary, Anthropology

During the 17th and 18th centuries, the Lake Champlain-Richelieu River Corridor was a 'border-zone', highly contested between the Native and European powers of the Atlantic world. In the summer of 2012, a team of archaeologists, educators and artists undertook a canoe-based landscape archaeological survey of the region. The team investigated colonial period forts and Native sites with the goal of discerning whether the placement of sites within the landscape was purely strategic, or whether social and political pressures played a part in the location of settlements. Approaching all sites from the water-level, as would have been done three hundred years ago, the team made observations, recording quantitative and qualitative data, while the artists employed historic maps and recorded data to place buildings back on the landscape. This poster displays the results of this unique historical archaeology landscape/waterscape survey through the lens of border theory on the New France/New England boundary.

African Diaspora Intellectual Scholarship in Anthropology

Presenter: Brittany Brown
Advisor: Frederick Smith
College of William and Mary, Anthropology

In recent years, anthropologists of African descent have criticized mainstream anthropology as being uncritical, Eurocentric, and limiting in providing the tools necessary to understand the complex social, historical and cultural contexts of the African Diasporic experience. This paper contributes to this critique and argues the use of an African Diaspora Intellectual Scholarship (ADIS) is a more appropriate framework to investigate the lives, histories, and cultures of Black communities. ADIS, as an interdisciplinary, reflexive, political, empathetic, and activist framework, allows African Diaspora research to be critical, dialogical and non-authoritative. ADIS incorporates Black literatures, narratives, histories, philosophies, political texts, writings of Black anthropologists and other scholars of color. Since the discipline's beginning, ADIS has been opposed to the practices within mainstream anthropology. However, this paper argues for the integration of ADIS within the theoretical and methodological practices of mainstream anthropology. Furthermore, this paper demonstrates ADIS as a valid and mainstream approach that can be constructed for, and integrated within anthropological scholarship focused on Black and other minority communities.

Tastes on the "Tight Little Island": The Faunal Assemblages from the State House, St. George's, Bermuda

Presenter: Jenna Carlson
Advisor: Neil Norman
College of William and Mary, Anthropology

British colonists in the New World employed a variety of strategies to adjust to their new surroundings. Faunal assemblages from the State House in St. George's, Bermuda, were analyzed by the author in 2012 and represent over three hundred years of dietary preferences, from the mid- to late-17th century through the 20th century. The 18th and 19th assemblages from the State House strongly resemble the faunal assemblages from the contemporary Henry Tucker House in St. George's, which were analyzed in 1991 by another zooarchaeologist. These assemblages reveal how high status Bermudians embraced the marine environment along with Old World domesticates in the face of increasingly limited space and natural resources. Market access, personal preference, and socioeconomic standing greatly influenced the nature of this balance of Old and New World foodstuffs. The State House is unique among Bermudian assemblages because its faunal assemblages represent the combined taste preferences of multiple individuals of relatively high socio-economic status. Thus, this research assesses the delicate balance amongst the natural and economic environment and personal preference which played into the dietary choices of St. George's residents, by comparing the faunal assemblages from the State House and from the Henry Tucker House.

"Hung Up for a Skeleton in Barber-Surgeons-Hall": The Study of Anatomy in 18th Century Williamsburg

Presenter: Ellen Chapman
Advisor: Michael Blakey
College of William and Mary, Anthropology

The use of cadaver dissection and examination for the instruction of anatomy and surgery flourished in the 18th century with the publication of Albinus' Tabulae sceleti et musculorum corporis humani, despite the illegality of dissecting cadavers for medical scholarship. Dissection of the bodies of convicted criminals was first permitted in England in 1752, and similar laws were enacted in American colonies. During the late 18th century demand for anatomical cadavers far outstripped supply, and suspicions over grave-robbing led to panics like the 1788 Doctors' Riot in New York. Virginia did not allow legal dissection of non-criminals until 1884, so grave-robbing the corpses of African-Americans, paupers, and other disempowered groups became the major source of cadavers for medical study for well over a century. In colonial Williamsburg as elsewhere, apothecaries, surgeons, and doctors like George Gilmer, John Minson Galt, and William Pasteur used human skeletons as references for studying anatomy and instructing apprentices. At two Williamsburg archaeological sites, the Brush-Everard House and the Cary Peyton Armistead House, partial human remains recovered from refuse pits likely represent human bone used for anatomical study and display. This presentation will examine how these skeletons were likely procured for medical use and the historical and biological evidence regarding how these skeletons were prepared. Additionally, osteobiographies of these fragmentary remains will be employed to discuss colonial conflicts between demands for medical expertise, spiritual beliefs regarding the inviolability of the body, and denial of the humanity of vulnerable populations.

"Yeah, But Can It Kill You?" Understanding Endometriosis in the Atlanta Area

Presenter: Amanda Day
Advisor: Casandra White
Georgia State University, Anthropology

This paper contributes to a growing body of literature on women with endometriosis, a gynecological condition in which a tissue similar to the endometrium, or lining of the uterus which is shed during menses, grows elsewhere in the body particularly in the pelvic cavity. This condition has been linked to many symptoms, including chronic pain, depression, anxiety, and infertility. Despite a growing body of medical literature on the disease, it is still not well known by the general population or fully understood by the medical community. Issues that still persist are that causation is still unknown, treatments are highly debated and contested, and that the doctor-patient relationship for women with this illness suffers greatly. This paper incorporates a biomedical understanding of endometriosis with Emma Whelan's (2007) idea of these women as an epistemological community, Leon Anderson's (2006) concept of analytic autoethnography, and the narratives of sufferers in Atlanta. The work primarily draws upon individual interviews, a focus group, and readings of medical and social science literature in order to better understand the illness, how women discuss it, experience it, and form communities around it. It was found that women of dissimilar socioeconomic backgrounds approached and discussed the disease distinctively from one another with the three phases of coping with the illness, the discovery, quest, and revelation phases, still present.

Memorialization in Early Medieval Ireland: A Quantitative Study

Presenter: Madeleine Gunter
Advisor: Martin Gallivan
College of William & Mary, Anthropology

Isolated communities of ascetic monks dotted the cultural landscape of western Ireland's rocky metamorphic coastline during the early medieval period (800-1200 AD). Across seven disparate open-ocean islands, monks carved stylistically-similar, ornate burial monuments to commemorate the dead. Historical documentation and local folklore suggest that—in addition to sharing stylistic preferences—monks traded carved gravestones through inter-community pilgrimage. Despite these folkloric and historic accounts, no corroborating geologic evidence exists to definitively support or negate either cultural contact or gravestone exchange. In this paper, I explore potential methods for quantitatively testing whether gravestones were produced locally or exchanged from outside islands. I focus my discussion on portable X-ray fluorescence (pXRF), a burgeoning method for archaeological characterization and materials sourcing. Building upon several recent studies in pXRF reliability (precision and accuracy), I analyze pXRF measurements from over 200 fine-grained metamorphic and sedimentary gravestones and bedrock samples. Analyzing data from two case study sites, High Island and Caher Island, I aim to 1) establish gravestone provenience at those sites and 2) determine the relative precision and accuracy of pXRF when applied to metamorphic (schist, phyllite; courser-grained, mineralogically homogenous) rather than igneous (obsidian; fine-grained and mineralogically distinct) lithologies. While establishing pXRF's capabilities and limitations as a non-destructive analytical method is important, the ultimate goal of my research is to contextualize gravestone provenience data within the Irish monastic landscape. By combining historical documentation and quantitative analyses I hope to create a cohesive narrative about early monastic life, death, and memorialization.

The Archaeology of Irish Railroad Laborers in Mid-19th Century Virginia: Findings from the First Field Season

Presenter: Amanda Johnson
Advisor: Frederick Smith
College of William & Mary,
Anthropology

In 1850 the landscape 15 miles west of Charlottesville was dramatically altered as thousands of Irish immigrants were brought to the area to construct the Blue Ridge Railroad. The dangerous work consisted of several cuts and tunnels. One of the more difficult projects was the Blue Ridge or Afton tunnel. At its completion it stretched just under a mile and at the time was one of the longest tunnels in American history. During the summer of 2012, the excavations focused on standing dry-laid stone cabins located below the tracks on the property of the present-day Pollak Winery. The cabins were inhabited by Irish immigrants between 1850 and 1858. The aim of this paper is to detail the historical and archeological findings providing an intimate glimpse into the daily lives and experiences of the Irish laborers and their families.

Ajacán, Spanish Virginia, and the First Jesuit Mission in Florida

Presenter: Patrick Johnson
Advisor: Martin Gallivan
College of William & Mary,
Anthropology

A synthesis of available Spanish documents, several not yet translated into English, sheds new light on the 16th century social and physical landscape of Virginia. I contextualize these documents within broader efforts by the Spanish to expand from St. Augustine and Pensacola into the coast of South Carolina, the interior of North Carolina, and finally Virginia before ultimately falling back to the Georgia coast and Florida in 1587. Considering these missions and forts as expanding to present-day Virginia allows for untangling of descriptions of "La Florida," including Native American gift-giving practices, subsistence, ideology, alliances, and war. Syntheses of archaeological and historical records of Spanish expansion—particularly Juan Pardo's forts and Jesuit missions—in Florida, Georgia, and the Carolinas can guide efforts in Virginia. In other words, I provide a few ethnohistorical insights into 16th century Virginian Native Americans by considering this area of Virginia as a brief northern frontier of 16th century Spanish Florida. In addition to describing and contextualizing "Ajacán," the Spanish term for Virginia, I speculate about the archaeological signature of Spanish efforts, potential differences between the historical and archaeological records, and ultimately the dynamics of 16th century Native American power and place.

Life and Limb in Early America: A Synthesis of Mortuary Archaeology and Skeletal Analysis from Historic Gloucester Point, Virginia

Presenter: Laura Masur
Advisor: Danielle Moretti-Langholtz
College of William & Mary,
Anthropology

It's an all too familiar story: an archaeological site is excavated; features mapped, artifacts washed and (sometimes) cataloged…and then? The collected data and materials fall into the obscurity of storage rooms and archives. Many of the early field projects at Gloucester Point, Virginia have followed a similar trajectory. In this paper, I recount the way in which one type of feature from Gloucester Point – burials – has been "re-excavated" from the archives, placed on the modern landscape, analyzed, and compared to examples from eastern North America and England. The reanalysis of burial features serves as a model for the ways that spatial technologies can reclaim past archaeological projects. Gloucester Town, a colonial port located on Virginia's Middle Peninsula, was host to many of the same historical developments that occurred around Jamestown and Williamsburg: early colonial settlement and immigrants' experience of "seasoning" to the climate, tobacco monoculture, the expansion of the Virginia landed gentry, and the devastation wrought by the Revolutionary war. Most notably, it was General Cornwallis' post during the siege of Yorktown in 1781 and the site of a British military hospital – and graveyard. This paper discusses GIS techniques used to relocate excavated and unexcavated burial sites at Gloucester Point in order to understand their spatial relationships to each other and to historical plat maps. In addition, the analysis of human skeletal remains has been reexamined and compared to similar forensic and bioarchaeological studies of both early colonial immigrants and 18th to 19th century soldiers and sailors.

Isleño Commodities: Connecting Past and Present Archaeology of Canary Islanders

Presenter: Sarah Mattes
Advisor: Marley Brown
College of William & Mary,
Anthropology

The Canary Islands have been a node among many in an Atlantic network of imperialist machinations. In the centuries following the European rediscovery of the islands, varying political powers used both the islands and the islanders, or *Isleños*, to further their imperialist, and increasingly capitalist, objectives. France and Germany, for example, aimed their 19th century archaeological investigations in the Canary Islanders to justify annexation. Emigration was a useful political and economic tool for the Spanish as it was difficult to maintain production of a single commodity on the Canary Islands with increasing pan-Atlantic competition. I*sleños* emigrated to Spanish colonies in the Americas both by choice and by force, struggling to maintain an identity while still acting within the greater Spanish built and material framework. Though "*Isleño*" refers to people of the Canary Islands, this term encompasses a broad and ill-defined sense of identity. This paper will seek to define "*Isleño*" and how this ethnicity is manifested materially in Spanish colonial and Canarian contexts.

I Swear on the *Five Books of Moses*: Jewish Oaths and Subjectivity in Colonial Barbados

Presenter: Derek Miller
Advisor: Frederick Smith
College of William & Mary,
Anthropology

In 1674, the Barbados Colonial government passed a law giving Jews on the island the right to give testimony in courts based upon them swearing on the *Five Books of Moses* but only in cases dealing with trade. In all other cases, Jewish testimony sworn on the *Five Books of Moses* was considered illegitimate. The passing of the 1674 was the result of negotiations between the Jewish community and the colonial elites. The records of these debates highlight the various motivations behind the passing of the law. Through these negotiations, the ritual of oath taking within the courts was brought front and center as it was the major barrier for Jewish testimony. In the reinterpretation of the ritual oath, a shift can be detected from religion being a key role in the formation of colonial subjectivity to being a flexible category employed best to serve the colonial government's mercantile desires. The Jew became a split person: a legally equal merchant and legally silenced member in all parts of Barbadian society.

Reflections on Margery Wolf and the Feminist/Postmodernist Conflict

Presenter: Maxwell Werner
Advisor: Kathleen Bragdon
College of William & Mary,
Anthropology

In this paper, I will examine the tension between feminism and postmodernism in anthropology, paying particular attention to the respective interests of the two parties in anthropological agenda and ethnographic form. The project is inspired by Margery Wolf's *A Thrice-Told Tale* (1992) and Wolf's reaction to the postmodern wave in Anthropology widely considered to be represented by, and attributed to, *Writing Culture* (1986). I will then consider the ways in which an understanding of this tension might have informed and improved my work had I been aware of it while writing my MA thesis. Lastly, I will consider the present and future of the relationship between feminism and postmodernism in Anthropology based on my experiences at the 2012 American Anthropological Association Annual Meeting in San Francisco.

Multi-Class Sparse LDA via Linear Programming

Presenter: Sandra Addo
Advisor: Jeongyoun Ahn
University of Georgia,
Statistics

Linear discriminant Analysis (LDA) is a favorable tool for classification problems, partly because of its simplicity and robustness. Recent development in technology and data collection result in data that have more variables or features than the number of sample size, which is characterized as High Dimension, Low Sample Size (HDLSS) problems. Discrimination in such case is problematic partly because the covariance matrix is singular. It becomes relevant to develop new statistical methods that overcome this challenge and also results in discriminant vectors that are sparse. Sparsity is a desirable feature as it yields interpretable discriminant vectors. We propose a simple and effective discrimination method for multi-class classification of High Dimension, Low Sample Size (HDLSS) problems which results in discriminant vectors involving a subset of features. We utilize Fisher's idea of optimal separation which involves finding the discriminant vector that yields maximum separation between the classes relative to the variation within the classes and we impose sparsity with l-infinity constraint. We apply our method on simulated data and real data – microarray data and hand written data- and compare the proposed method to existing methods. Both simulated data and real data show the competitiveness of the proposed method especially under true assumption of sparsity of the features.

Epidemic Dynamics on a Payoff-Dependent Stochastic Social Network

Presenter: Shadrack Antwi
Advisor: Leah Shaw
College of William & Mary,
Applied Science

Complex networks can be used to model the effect of human behavior on infection dynamics in a population. Motivated by HIV, we consider how a trade-off between benefits and risks of sexual connections determines the network structure and disease prevalence. We define a stochastic network model with formation and breaking of links representing changes in sexual contacts. Each node has an intrinsic benefit its neighbors derive from connecting to it. A node's infection status is not apparent to others, but nodes with more connections (higher degree) are assumed more likely to be infected. The probability to form and break links is determined by a payoff computed from the benefit and degree-dependent risk. Nodes with higher payoff are preferred for new connections. Links exist by mutual consent of the two nodes involved and so either node may break the link if it views the other's payoff as relatively too low. The disease is represented by an SI (susceptible-infected) model. We study the network and epidemic evolution via Monte Carlo simulation and analytically predict the behavior with a heterogeneous mean field approach. The dependence of network connectivity and infection threshold on parameters is determined, and the steady state degree distribution and epidemic levels are obtained. We also study a situation where system-wide infection levels alter perception of risk and make nodes adjust their behavior to reduce their chance of infection. This is a case of an adaptive network, where node status feeds back to change network geometry.

Acoustic Detection and Classification of Oncoming Vehicles by a Walking-Speed Robotic Sensor Platform

Presenter: Eric Dieckman
Advisor: Mark Hinders
College of William & Mary,
Applied Science

In order to perform useful tasks for us, robots must have the ability to notice, recognize, and respond to objects and events in their environment. For walking -speed robots this requires a mix of passive and active short- and long-range sensors, along with the sophisticated signal and image processing to deal with large quantities of information. Our previous work used sonar backscatter and thermal imaging to identify and differentiate fixed landmarks; currently we are using nonlinear acoustic echolocation sensors to detect and classify oncoming vehicular traffic. More than 6,000 acoustic backscatter measurements have been collected over 40 sorties in a wide range of environmental conditions. Wavelet fingerprint signal processing techniques allow us to identify subtle differences between the reflected signals of different classes of vehicles. Using pattern classification we can automatically categorize an unknown vehicle from its reflected acoustic signal. To better understand the interaction of the sound field with the vehicle we combine finite difference solutions of the KZK equation with a 3D acoustic finite integration simulation. These simulations allow us to propagate a nonlinear acoustic beam to a real-world target and then study the scattering from the target.

Shear-Induced Self-Assembly of Native and Reconstituted *B. mori* Silk Revealed at the Molecular Scale by Atomic Force Microscopy

Presenter: Sean Koebley
Advisor: Hannes Schniepp
College of William & Mary,
Applied Science

Spider silk is a natural polymer renowned for its outstanding strength and ability to absorb energy, but the goal of similarly impressive artificial silk remains elusive. Because shearing forces are crucial in the processing of silk, we imaged *B. mori* (silkworm) silk protein dopes under different concentrations and shear conditions using in situ non-contact mode atomic force microscopy (NC-AFM) and observed the self-assembly of silk proteins into novel morphologies. When we sheared highly concentrated native silk fibroin harvested directly from *B. mori* specimens, we found nanofibrils 20-25 nm in diameter and multiple micrometers in length oriented parallel to the direction of shear. These long nanofibrils formed under shear are comparable in morphology to the fibrils observed on the surface of silk, which are thought to be formed during spinning by the shear force between the silk protein and spigot wall. We also tested reconstituted silk fibroin (RSF), a popular substitute for native silk for its ease of acquisition by dissolving *B. mori* cocoons. Under similar shear conditions, the RSF produced fibrils 20-25 nm diameter fibrils that were highly branched, less than a micrometer in length, and lacking in orientation relative to the axis of shear. These striking differences in self-assembly between native silk dope and RSF reveal a key limitation of RSF as a model for natural silk and show that NC-AFM is a powerful tool for the study of self-assembly in silk protein.

Journeys through Euclidean and Non-Euclidean Geometries

Presenter: Raymond LaRochelle
Advisor: Stephen Casey
American University,
Mathematics & Statistics

There are three different types of geometries for orientable surfaces: Euclidean (flat), spherical, and hyperbolic. Amazingly, we live in all three at once; it all depends on scale. When we drive around town, we measure distances and angles as if we were on a flat surface, i.e., in Euclidean geometry. When planes fly around the world, they measure paths and angles on the surface of the Earth, using spherical geometry. Let's increase the scale even further. It turns out that our universe acts under the laws of hyperbolic geometry, according to Einstein's theory of relativity. Over extremely long distances, Euclidean geometry does not accurately measure angles and lengths. While Euclidean geometry is easily visualized by students, spherical and hyperbolic geometries provide a challenge. The study of geometry boils down to studying a specific class of functions (Felix Klein's Erlangen Program), and then computing angles and distances in terms of these functions. (For example, in Euclidean geometry, the functions we study are rotations, reflections, and translations.) The spherical and hyperbolic functions we study are different from the ones we are familiar with in flat geometry. Consequently, distances and angles are not the same. Difficulties in visualizing this geometry can be overcome. My project addresses this, with computer programs and graphics that represent spherical and hyperbolic worlds. I will create visual tools for understanding the different geometries. My goal is to give any interested person, from an elementary school student to an academic, the ability to understand Euclidean, spherical, and hyperbolic worlds.

Probing Rock-Crude Oil Interactions using Atomic Force Spectroscopy

Presenter: Laura Rickard
Advisor: Hannes Schniepp
College of William & Mary,
Applied Science

In many cases, the efficiency of oil recovery is reduced due to the tendency of crude oil to adhere to rock surfaces. The use of injection wells to force additional oil to the surface by means of pressurized liquid increases oil yields to some extent, but still leaves a majority of the oil in the reservoir. The goal of this project is to enhance oil recovery by modulating the composition of the injection liquid to reduce this adhesion. Significant contributors to the adhesion are the attractive van der Waals forces, which have a short range in liquid. Although changing the liquid composition does not directly affect the van der Waals forces, it does change the range of the repulsive electrostatic forces. The relative strengths of these competing forces at different ranges affect which force is dominant at a particular distance, which consequently affects the adhesion. Direct measurements of the physical rock–oil interactions in a liquid environment will provide the most systematic approach to determine how to reduce this adhesion. However, this task is challenging, since both the crude oil and the rocks found in reservoirs consist of many compounds; studying simplified model systems does thus not promise meaningful results. The novel experimental approach taken in this project is based on atomic force spectroscopy and allows direct measurements of the forces between microscopic crude oil droplets and microscopically small rock grains. The results demonstrate that changing the solution conditions systematically alters the oil–rock interactions.

Niobium Nitride Thin Films and Multilayers for Superconducting Radio Frequency Cavities

Presenter: William Roach
Advisor: R. Ale Lukaszew
College of William & Mary, Applied Science

Niobium nitride in thin film form has been considered for a number of applications including multilayered coatings onto superconducting radio frequency cavities which have been proposed to overcome the fundamental accelerating gradient limit of ~50 MV/m in niobium based accelerators [1]. In order to fulfill the latter application, the selected superconductor's thermodynamic critical field, Hc, must be larger than that of niobium and separated from the Nb surface by an insulating layer in order to shield the Nb cavity from field penetration and thus allow higher field gradients. Thus, for the successful implementation of such multilayered stack it is important to consider not just the materials inherent properties but also how these properties may be affected in thin film geometry and also by the specific deposition techniques used. Here, we show the results of our correlated study of structure and superconducting properties in niobium nitride thin films and discuss the shielding exhibited in NbN/MgO/Nb multilayer samples beyond the lower critical field of Nb for the first time. [1] A. Gurevich, Appl. Phys. Lett., 88, 012511 (2006).

Multi-Mode Lamb Wave Tomography of Pipes

Presenter: Du Shen
Advisor: Mark Hinders
College of William & Mary, Applied Science

Lamb waves are an effective tool for non-destructive evaluation (NDE) of extended structures, including detecting flaws in pipes. Each Lamb wave mode has its own unique dispersion relation, which describes how the velocity of this particular mode changes when the product of wall thickness and frequency changes. Previous work has mostly used the first-arriving mode, while multiple modes better show details of the inspected area because different modes are sensitive to different types of flaws. Because of the complexity of Lamb waves in pipes, correctly extracting the arrival times of particular modes is the key challenge. Dynamic Wavelet Fingerprints (DWFP) are used to convert the waveforms to binary time-scale images where fingerprint features can be used to identify and track wave modes. Tomographic reconstruction is then used to create a map of pipe wall thickness in order to locate and size flaws.

Langevin Formulations for Stochastic Calcium Release via Coupled Intracellular Channels

Presenter: Xiao Wang
Co-Authors: Y. Hao, S.H. Weinberg
Advisor: Gregory Smith
College of William & Mary,
Applied Science

Markov chain models of the coupled gating of intracellular calcium channels are used to study the stochastic dynamics of SR calcium release and whole call calcium homeostasis. However, the large number of channels per release site (50-250) results in a combinatorial state space explosion that causes whole cell models that enumerate the Markov chain state space to be computationally intensive. We present an alternative Langevin formulation for the stochastic dynamics of calcium release sites composed of many identical channels. The Langevin formulation accurately reproduces the stationary distribution for the fraction of open channels determined from the corresponding Markov chain model and over a wide range of parameters yields similar spark properties (e.g., the distribution of spark amplitude and duration). We present a whole cell model of calcium homeostasis that incorporates the Langevin description of stochastic calcium release by coupling the associated Fokker-Planck equation to balance equations for the bulk myoplasmic and network SR calcium concentration, we show that the model's computationally efficiency facilitates comparison with recent experiments on calcium homeostasis in permeabilized ventricular myocytes.

Nanocluster Effects on Magneto-Resistance and Optical Second-Harmonic Generation in Au-Co Composite Films

Presenter: Kaida Yang
Co-Author: T. Murzina
Advisor: R. Ale Lukaszew
College of William & Mary,
Applied Science

Magnetic nanomaterials typically exhibit significant differences in their magnetic and magnetic-optical properties compared to bulk. A viable nanoscale platform to investigate the magnetic and magneto-optical properties of magnetic nanomaterials is in composite thin films where the aim is to have magnetic clusters embedded on a different matrix material and where their size as well as the composite film thickness can be tailored. The Au-Co binary system is a typical phase-separation system in its bulk phase diagram . The thin film nanocomposite geometry allows tailoring the actual composition and microstructure of the composite by exploiting different temperature during deposition. In our previous studies, we have shown that Au/Co/Au trilayers as well as Au-Co nanocomposite thin films exhibit strong enhancement of the magneto-optical activities due to surface plasmon polariton excitation in the noble metal. In this research, we investigate other non-linear optical properties such as second harmonic generation (SHG) in Au-Co nanocomposite thin films and understand its correlation with the magneto-transport properties of the composite. Optical SHG is a sensitive probe of surface and buried interfaces due to inversion symmetry breaking at the interfaces of centrosymmetric materials which allows probing of the structural and morphological properties near interfaces.

Characterization of Interfacial Attractions between Graphene Oxide Nanoparticles and Polymer in Different Polymer Nanocomposites

Presenter: Jie Yang
Advisor: Hannes Schniepp
College of William & Mary,
Applied Science

Graphene oxide has emerged as an outstanding nanofiller for polymer nanocomposites because it has extraordinary mechanical properties and can be produced economically. When embedded appropriately, graphene oxide can significantly improve the mechanical properties of the polymer matrix. Of all the factors affecting the mechanical performance, the interfacial attractions between graphene oxide and the polymer matrix are pivotal but still difficult to measure directly. In this research we present a novel experimental method, the “peeling test”, to directly measure and compare the interfacial attractions between graphene oxide and polymers in different polymer nanocomposite systems. By using atomic force microscopy techniques to analyze the system, we can find potential factors that determine the interfacial attractions. In our experiments, graphene oxide was sandwiched between two different materials with atomically smooth surfaces. We obtained the relative interfacial attractions after we peeled off one material from the other and used atomic force microscopy to show that graphene oxide nanoparticles were prone to attach to one of the surfaces. The results indicate that our experimental method is effective at measuring and comparing the interfacial attraction in different polymer nanocomposite systems. This method paves the way to better understanding the principle of interfacial attractions between individual nanoparticles and polymers and can also be applied to other nanocomposite systems.

Adaptation of *H. pylori* to Changing Environments Based on Allelic Variation of Sensor Kinase ArsS

Presenter: Monique Bennett
Advisor: Mark Forsyth
College of William & Mary,
Biology

Helicobacter pylori is a Gram-negative bacterium that infects the human stomach and can cause illnesses ranging from gastric or duodenal ulcers to gastric cancer. To survive in the human stomach, *H. pylori* must sense and respond to environmental signals, partially via two-component signal transduction systems that lead to altered gene expression as an adaptive response. My research examines one of these transduction systems, ArsRS, specifically the histidine kinase ArsS. ArsS may mediate the ability of *H. pylori* to adapt to different acid environments in the stomach through differentially expressing variant ArsS isoforms. The isoforms are created by means of a hypermutable homopolymeric cytosine tract that lies within arsS. These varying isoforms may then confer a selective advantage to *H. pylori* when the bacteria need to adapt to different stomach conditions. The effects of these isoforms can be studied by making freeze frame mutations in which bacterium can express only a single isoform at a time. After these mutations are cloned into *H. pylori*, the persistence of the corresponding mutants can be studied under differing acidic conditions and ArsS isoform half-lives analyzed through antibody reactivity. qRT-PCR can also be performed on known gene targets of ArsS, such as sabA, to determine different outputs for various isoforms. A better characterization of ArsS through these experiments could improve the understanding of how *H. pylori* is able to infect the human stomach for decades.

Genome Architecture of *Trypanosoma cruzi* DTUs Compared to *Trypanosoma conorhini* and *Trypanosoma rangeli*

Presenter: Kate Bradwell
Co-Authors: V. Koparde, A. Matreyer, M. Semano, N. Sheth
Advisor: Gregory Buck
Virginia Commonwealth University,
Life Sciences

Trypanosoma cruzi is a protozoan parasite responsible for Chagas disease, which affects around eight million people and is endemic in Latin America. *T. cruzi* populations include six discrete typing units (DTUs), TcI-VI. Herein, we compare the genomes of *T. cruzi* DTUs with *Trypanosoma rangeli* and *Trypanosoma conorhini*, the latter two being largely non-pathogenic. Our goal is to aid reconstruction of an ancestral karyotype, understand reasons for synteny (gene order) conservation, and determine evolutionary consequences of genomic rearrangements on trypanosomatid genomes and pathogenesis. Moreover, since preservation of synteny is an indication of the presence of true genes, this effort will support gene annotation pipelines. Unusual features of trypanosomatid genomes, such as the significance of polycistronic transcriptional units, highly constrained gene order, and large size variations between individual chromosomes of a diploid pair, will be addressed by this study. Thus, we have created assemblies, run bioinformatics analysis and carried out Pulsed Field Gel Electrophoresis on the genomes of *T. cruzi* DTUs, *T. rangeli*, and *T. conorhini* strains. These analyses show substantial variation in the karyotypes of the *T. conorhini* strains, including variation in the distribution of chromosome sizes and numbers. Moreover, our preliminary analyses revealed key differences among the genomes of *T. cruzi, T. rangeli*, and *T. conorhini*.

Mate Choice vs. Mate Guarding: The Behavioral Aspects of Reproductive Skew in Acorn Woodpeckers (*Melanerpes formicivorus*)

Presenter: Anna Brownson
Co-Author: W. Koenig
Advisor: Eric Walters
Old Dominion University,
Biology

Acorn woodpeckers (*Melanerpes formicivorus*) are characterized by a highly variable mating system ranging from monogamy to cooperative polygynandry. Genetic analysis of the paternity of chicks in polyandrous groups has revealed high reproductive skew. Yet, this skew is not reflected in a clear dominance hierarchy among males, and overall paternity frequently switches in subsequent nests during the same breeding season. We proposed that the observed patterns of reproductive skew are a direct result of mate guarding vigilance of the males in polyandrous groups. Alternatively, we hypothesized that the female in polyandrous groups controls skew through mate choice, and obscures paternity by only copulating with males inside tree cavities. To determine how paternity is partitioned, in 2010-2012 we quantified the mate guarding behavior of males during the fertile period of the female, and quantified the behavior of potential breeders near nest cavities during the fertile period of the females at the Hastings Reserve in California. Preliminary results indicate that males in polyandrous groups mate guard with equal intensity, 93% of the time (n=31); with no significant variation in mate guarding intensity among co-breeding males, indicating competition for the female is high. The frequency with which males entered tree cavities with a female differed significantly among males, suggesting tree cavities restrict access to the female, facilitating a degree of mate choice for the female in an otherwise highly competitive social environment. In the future, these results will be used to predict overall paternity in nests for which these behaviors were quantified.

The Effect of Methylmercury on Immune Response to a Common Parasite in Zebra Finches

Presenter: Jessica Ebers
Co-Authors: C. Ramos, J. Swaddle
Advisor: Daniel Cristol
College of William & Mary,
Biology

Methylmercury (MeHg) is a common environmental pollutant and biological stressor to many animal populations, including terrestrial and aquatic birds. In birds, MeHg reduces the proliferation of B-lymphocytes, presumably resulting in compromised immune functioning. Additional research in free-living birds has indicated immunosuppression by MeHg. It is unknown whether immune suppression by MeHg increases likelihood of parasitic infection, thus reducing the health of the bird. We observed the effect of MeHg on the ability of a model bird species to fight off a common parasitic infection. A control group was fed a diet containing 0.0ppm MeHg, and an experimental group was fed a diet with 1.2 ppm MeHg, a concentration equivalent to levels a wild bird would encounter at a highly contaminated site. The birds were orally inoculated with a sub-lethal, constant solution of sporulated Isospora oocysts to induce coccidiosis. Infection rates were determined by the presence of oocysts in the feces. In addition, immunological assays were performed to determine the immune response to the parasite. We expect birds exposed to MeHg to have higher infection rates and suppressed immune systems. High parasite infection rates in wild populations can impose selection on life history strategies and population dynamics. The findings from this study will provide insight into the influence and negative impacts of MeHg on bird health.

A Substrate-Trapping Mutant of Ulp1 for the Identification of SUMO Protease Targets

Presenter: Mark Guillotte
Co-Author: J. Wells
Advisor: Oliver Kerscher
College of William & Mary,
Biology

Eukaryotic cells utilize addition and removal of SUMO, a small ubiquitin-like modifier, to modulate protein function. SUMO modification and demodification is facilitated by SUMO ligases and SUMO proteases, respectively. In the yeast Saccharomyces cerevisiae, the SUMO protease Ulp1 is responsible for removing SUMO from target proteins and for processing precursor SUMO into its conjugation-competent form. Yeast cells lacking Ulp1 are not viable and arrest in the G2/M phase of the cell cycle. We hypothesize that this cell cycle arrest may be due to the accumulation of a specific Ulp1 substrate with a role in cell cycle progression. Using a novel substrate-trapping truncation mutant of Ulp1, (Ulp1(3)(C580S)), we have devised a strategy to affinity purify sumoylated Ulp1 substrates. Here we describe the identification and functional characterization of novel Ulp1 substrates including those with a potential role in cell cycle progression.

Incomplete Song Divergence between the Recently Diverged Orchard and Fuertes' Orioles

Presenter: Natasha Hagemeyer
Co-Authors: K. Omland, J. Price, R. Sturge
Advisor: Eric Walters
Old Dominion University,
Ecology

Orchard Orioles (*Icterus spurius*) and Fuertes' Orioles (*I. fuertesi*) are recently diverged, forming an ideal system for investigating trait evolution and mechanisms of reproductive isolation during the early stages of speciation. These closely related songbirds diverged less than 200,000 years ago and exhibit little or no interbreeding. The taxa differ in adult male plumage coloration and in their breeding and wintering ranges, but quantitative comparisons of their song characteristics have revealed no discernible differences. We assessed evolutionary song divergence in this group by investigating patterns of syllable-type sharing within and between populations. Of 529 distinct syllable types, 142 (26.8%) were shared among individuals, and sharing appeared to decrease with geographic distance. The total number of syllables shared between Orchard and Fuertes' orioles (26; 4.9% of the total) was similar to levels of sharing between populations of Orchard Orioles. Furthermore, hierarchical cluster analyses showed individuals of the two taxa intermixed. Syllables also used as calls were shared more frequently within and between taxa, suggesting that they have evolved more slowly than those used exclusively in songs. Our results show that at least some aspects of song have not yet diverged between these incipient species, either due to cultural exchange or because songs have evolved relatively slowly compared to plumage colors. These shared vocalizations may represent the retention of ancestral syllable types which have persisted since the two taxa diverged, providing intriguing evidence that some characteristics of song may diverge more slowly than often assumed.

Systematics of the Chrysophyceae Inferred from 18S rRNA Sequences and Morphological Data

Presenter: Ashley Hayes
Advisor: J. Craig Bailey
University of North Carolina Wilmington,
Biology & Marine Biology

The classification of chrysophyte species is principally based upon morphological features visible at the level of the light microscope. For example, orders are defined based upon species' predominate vegetative life stage whereas families are delimited by the number of flagella, the presence or absence of scales and their composition (organic vs, mineralized), among other features. This study focuses on the systematics of 18 novel chrysophyte isolates recently brought into culture. These isolates include strains that are predominantly capsoid or palmelloid, strains that are loricate, with or without flagella, and those that are amoeboid. We have combined morphological data gathered at the level of the light microscope with 18S rRNA gene sequence data to (1) accurately identify each of the 18 isolates and (2) re-evaluate their relationships to other species in a phylogenetic context. Results indicate that DNA based phylogenies for the class are highly incongruent with morphology-based classifications rendering many chrysophyte families polyphyletic. Results imply that the flagellate condition is likely ancestral for the Chrysophyceae in toto and that other life forms (e.g., capsoid, palmelloid, and scale-covered) evolved independently on separate occasions.

The Effects of Urbanization on the Relationship Among Birds, Ticks, and Tick-borne Diseases

Presenter: Erin Heller
Co-Author: H. Gaff
Advisor: Eric Walters
Old Dominion University,
Biological Sciences

The Hampton Roads Region of Virginia is one of the largest urban areas within the Atlantic Flyway, one of four major avian migratory flyways in North America. At least 500 species of birds, 40% of which are of conservation concern, use this flyway; thus, understanding factors affecting species mortality is of paramount concern. By capturing and banding birds at sites of varying levels of urbanization within the Hampton Roads urban matrix, we studied the roles birds play in tick-borne disease prevalence. We set-up mistnets at 4 sites starting in July 2012 in order to catch, band, draw blood, and collect ticks from migratory and resident birds. The ticks were identified to species in order to determine what tick species have preferred avian hosts. Both the ticks and avian blood will be tested for various diseases. Preliminary results show that the proportion of birds caught with ticks is greater at less urbanized sites than at more urbanized ones and that ticks are more commonly found on ground-foraging species such as Carolina Wrens (*Throthorus ludovicianus*). The most common ticks collected from birds thus far are larval Rabbit Ticks (*Haemaphysalis leporispalustris*), which were extracted four times more at the least urbanized site when compared to the other three. Seasonal trends show that mid-September and early November are the most productive for catching birds, likely due to fall migrations. This study demonstrates how levels of urbanization influences avian host choice by ticks and increases knowledge of the corresponding relationship between urbanization and disease prevalence.

Comparative Genomics of the cag Pathogenicity Island Negative Isolates of *Helicobacter pylori*

Presenter: Lauren Hurst
Advisor: Mark Forsyth
College of William & Mary,
Biology

Helicobacter pylori is the causative agent of gastric and duodenal ulcers and is the etiologic agent of gastric cancer, making *H. pylori* the only known bacterial human carcinogen. A primary determinant of virulence is the presence of the cag pathogenicity island (cag PAI), a 40 kb region of chromosomal DNA. *H. pylori* cells with this PAI are termed cag (+) while those without are cag (-). An overarching question our lab is addressing is whether there are other genes that have a symbiotic relationship that would be selected against during cag (-) expression via gene deletion or pseudogenes, etc. Virulence can be inferred through the expression of the cag PAI or through the loss or mutation of another gene. I will be addressing three aims. The characterization of an *H. pylori* prophage found among cag PAI negative isolates by PCR amplification from individual isolates. I also propose to create an *H. pylori* mutant via plasmid recombination to delete a prophage which we have hypothesized to be found primarily within cag (-) strains; this will be accomplished through homologous recombination. Finally, I will compare the genomes of two cag (-) *H. pylori* isolates to each other as well as to the multitude of cag (+) *H. pylori* strains genomes present in publically accessible databases. This will be the largest part of my project as it utilizes Ion Torrent next generation sequencing technology. I hope to characterize the *H. pylori* genome, specifically those of the cag PAI negative strains. There is little known about the cag (-) strains due to their diminished virulence relative to those isolates possessing the cag PAI.

Using Spatial Models to Assess the Impacts of Landscape Level Factors on the Distribution of Diamondback Terrapins

Presenter: Robert Isdell, III
Co-Authors: D. Bilkovic, R. Chambers, J. Swaddle
Advisor: Matthias Leu
College of William & Mary,
Biology

Species distributions have long been known to correlate with landscape features. Over time, humans have been altering species distributions, both directly and indirectly, by modifying those landscape features, particularly the terrestrial-aquatic ecotone. With more than 6,000 km of shoreline, Virginia's Chesapeake Bay provides an excellent opportunity to study how human modifications of this ecotone affect the distribution of the world's only estuarine turtle, the Diamondback Terrapin (*Malaclemys terrapin*). Terrapins are particularly susceptible to human modifications due to their reliance on both terrestrial and aquatic habitats. Modifications such as shoreline hardening alter foraging and nursery habitats and prevent terrapins from accessing nesting grounds. Crab pots are also a significant source of incidental mortality in the small creeks that terrapins inhabit. To assess the effects of these modifications to terrapin distribution, 85 locations around the lower Chesapeake Bay were surveyed for presence and number of diamondback terrapins. Local and landscape level characteristics were extracted from a Geographic Information System (GIS) and then examined for any important effect on terrapin distribution using occupancy modeling and information theoretic approaches. Preliminary analyses indicate that both shoreline hardening and crab pots were shown to negatively affect terrapin occupancy, while marsh positively affected terrapin occupancy.

Wood Thrush Resource Selection in Human-Altered Landscape: a Multi-Scale Analysis

Presenter: Vitek Jirinec
Advisor: Matthias Leu
College of William & Mary,
Biology

Habitat loss and degradation are the greatest threats to biodiversity. In most cases, this loss is caused by human modification of natural environments. One of the central tenets of conservation biology is the patch-matrix concept, where patches of suitable habitat are surrounded by unsuitable matrix. Habitat suitability is affected by an interplay of multiple biotic and abiotic attributes of the surrounding landscape. These attributes increasingly involve anthropogenic features, and may reduce habitat quality for wildlife, including birds. Populations of the Wood Thrush (*Hylocichla mustelina*), have fallen dramatically in the last few decades. The Wood Thrush is a forest associate that forages in the leaf litter. In the spring, the species migrates from Central America to breed in the eastern United States, including Chesapeake Bay lowlands. This project will examine the effects of human disturbance on Wood Thrush distribution in southeastern Virginia. Evidence suggests that highly mobile organisms, such as birds, assess habitat suitability at various scales. Therefore, I will incorporate a scale factor into the study design. First, Wood Thrush distribution will be examined across the span of Virginia Peninsula using the point count survey method. Second, birds will be captured at sites with differential occupancy and tracked through their territories using radio telemetry. Third, nest and roost sites will be located. At all three scales, the effects of human influence will be scrutinized. I hypothesize that humans have a negative impact on Wood Thrush distribution, such that anthropogenic presence will coincide with lower Wood Thrush occupancy and habitat use.

T-RFLP Analysis of T4-Type Bacteriophage in Soil to Provide Samples with a DNA Profile

Presenter: Elizabeth Kudirka
Advisor: Cynthia Zeller
Towson University,
Forensic Science

Current forensic analysis of soil involves examination of chemical and microscopic characteristics. These characteristics can narrow down the origin of a sample to an area of similar underlying geology, but cannot pinpoint origin. Researchers have attempted to give soil a DNA profile by subjecting microbial DNA to Terminal Restriction Length Polymorphism (T-RFLP) analysis. The discriminating power of this analysis has been found to be dependent upon by the type of microbe targeted. Subgroups of bacteria have better discriminating power than entire bacterial populations; and organisms that develop relationships with their environment, like fungi, appear to be an even better discriminator. This project aims to determine if bacteriophage are a suitable target for this analysis, because of their relationship with bacteria, their high genetic diversity, and their simplicity. For T-RFLP analysis of T4-type bacteriophage to be forensically useful, the population must be variable over space, but stable over time. DNA is extracted from monthly soil samples from throughout Maryland using a chemical flocculation treatment followed by an organic extraction. Amplification of the g23 gene (a universal gene for T4-type phage) is performed with fluorescently-labeled primers and followed by digestion with several restriction enzymes. These digestions allow for only the detection of the terminal fragments of the gene when subjected to electrophoresis. This presentation will discuss the experimental design, as well as, preliminary findings of this on-going research. Early findings suggest that it is possible to isolate bacteriophage DNA from soil and that different restriction enzymes produce variation in fragment length.

Effectiveness of the "Sonic Net" at Displacing European Starlings from Economically Important Locations

Presenter: Ghazi Mahjoub
Co-Authors: E. Dieckman, M. Hinders, E. Skinner
Advisor: John Swaddle
College of William & Mary, Biology

Invasive avian species are responsible for considerable economic, social, conservation and resource damages totaling approximately $1.9 billion every year in the United States alone. We focused on limiting the distribution of the European starling (*Sturnus Vulgaris*), which is the most destructive invasive pest bird in the US. Starlings cause tremendous crop losses and pose significant risks to airplanes through bird-aircraft strikes. The goal of our project is to develop an effective system to control the spatial distribution of starlings at economically and societally important locations. Previous technologies used to deter pest birds have generally failed as birds quickly habituate to the scare regimes. Using non-linear ultrasonic parametric arrays, we will broadcast a directional sound that is contained in specific areas creating a "net" that we hypothesize will disrupt/block communication channels among starlings. If starlings cannot communicate previous studies indicate that birds will vacate the area and feed elsewhere. Using wild caught starlings in a large aviary, we will deploy a "sonic net" over one food patch leaving another food patch unaltered. We will measure the vigilance and feeding behaviors of flocks of starlings over several days of treatment. We predict that the "sonic net" treatment will result in an increase in the birds' vigilance and a decrease in foraging efficiency. In general, we predict that blocking communication channels with the "sonic net" will displace the starlings to an acoustically more suitable environment, which has implication for protecting crops and deterring this species from sensitive areas of airports.

Are Human Footprint Models an Adequate Tool to Predict Ecological Processes?

Presenter: Jessica Pouder
Advisor: Matthias Leu
College of William & Mary, Biology

Transformation of landscapes and land cover for human use underlies most conservation problems. Biologists are increasingly using human footprint models with extensive spatial datasets to gauge the effects of humans on ecosystem processes. My study proposes to compare three approaches to develop human footprint models, ranging in model complexity from low to high, to see how accurately these models predict human effects on ecological processes. I will test each model's predictive capabilities at fine and broad scales. For the fine scale comparison, I will use bird survey data collected from eastern Virginia, which is heavily fragmented by anthropogenic activities. For the broad scale comparison, I will use data from the Breeding Bird Survey in the less fragmented western United States. To compare how well human footprint models capture effects of human stressors on ecological processes, I will evaluate how species richness, for synanthropic (i.e., species benefiting from human landscapes) and area sensitive species gilds, relate to human footprint scores predicted by the models at both fine and broad scales. If human footprint models are predictive, then synanthropic species richness should correlate positively whereas area-sensitive species richness should correlate negatively with high-intensity human footprint scores. To further explain variation in species richness, I will run sensitivity analysis to determine if certain anthropogenic features (i.e., traffic) are good predictors of species presence. The findings of my work will enable land managers to evaluate the use of human impact models in predicting effects of human land use on ecological processes.

Examination of Neuronal Variation in GnRH within a Wild Population of *Peromyscus leucopus*

Presenter: Melissa Proffitt
Advisor: Paul Heideman
College of William & Mary,
Biology

The hormone gonadotropin releasing hormone (GnRH) has been accurately nicknamed the master hormone of reproduction because of its regulatory role in reproductive pathways. A high percentage of individuals in many rodent species undergo reproductive inactivation during the winter, but others do not. In most individuals, the gonads regress and sex steroids such as testosterone or estrogen are not produced, while in others the gonads remain fertile and sex steroids are produced. In our laboratory, two breeding lines were developed through artificial selection of an originally wild white footed mouse population (*Peromyscus leucopus*). One line is reproductively suppressed in winter conditions, while the other remains reproductively active. Two previous studies indicated higher numbers of GnRH neurons in the mice that remain reproductively active and that this trait is heritable (*Heideman et al*., 2007: *Avigdor,* 2005). These reproductively suppressed and active mice coexist naturally as two subsets of animals in wild populations. This study will examine if there is a correlation between GnRH neuron number and reproductive status in the wild mice, since it is unknown what the relationship might be in any wild population. Mice will be collected from the College Woods around the William and Mary campus. The mass of reproductive organs will be used as a measure of fertility, and immunocytochemistry will be performed to count the number of GnRH neurons present to compare both subsets of the population. We predict a difference in GnRH neuron number between the seasonally repressed mice and the mice that remain reproductively active.

The Role of MK-STYX on RhoA Activity

Presenter: Lauren Rusnak
Advisor: Shantá Hinton
College of William & Mary,
Biology

The protein tyrosine phosphatase (PTP) family has members that display the structural features of the enzymes, but lack the critical nucleophilic cysteine in the active site for catalysis. Thus, these proteins are catalytically dead and referred to as pseudophosphatases. The pseudophosphatase MK-STYX [MAPK (mitogen-activated protein kinase) phosphoserine/threonine/tyrosine-binding protein], a member of the dual specificity phosphatase subfamily of PTPs, is catalytically inactive due to the fact that it has a phenylalanine and serine in its signature motif where the expected histidine and cysteine would be. Our previous studies showed that MK-STYX interacts with G3BP-1 [Ras-GAP (GTPase-activating protein) SH3 (Src homology 3) domain-binding protein-1], and inhibits stress granules. However, MK-STYX's mode of action has not yet been determined. To understand its mode of action, we focus on the pseudophosphatase's role in various signaling pathways. This study investigates the role of MK-STYX in the RhoA pathway, which regulates the stress granule and apoptotic pathways. RhoA activity pull-down assays with cells overexpressing MK-STYX showed that MK-STYX changes the pattern of RhoA activation early after stimulation. Furthermore, Coomassie stain showed that other proteins were pulled down with active RhoA in the presence of MK-STYX. These results show that MK-STYX modulates the RhoA pathway, strongly supporting our hypothesis that the pseudophosphatase has a role in regulating signaling pathways. Future goals of this study are to identify these proteins, and to determine whether MK-STYX affects any downstream effectors of RhoA.

The Effects of Sublethal Methylmercury Exposure on Pigmented Coloration in Songbirds

Presenter: Jessica Spickler
Co-Authors: J. Swaddle, C. Varian-Ramos
Advisor: Daniel Cristol
College of William & Mary,
Biology

Mercury is a persistent environmental toxin known to have adverse effects on the neurological, reproductive, developmental, and immune processes in many animals, including birds. Pigmentation is an important physiological process which produces color for camouflage, communication, and cellular protection. Because mercury negatively impacts processes that pigmentation relies on, exposure to mercury could negatively impact birds' ability to produce these signals. Because birds use their colors to communicate, blend in, and attract mates, any effect on coloration will have important fitness and conservation implications. The objective of this study was to quantify whether dosed birds differed from undosed controls in color reflectance. Zebra Finches (*Taeniopygia gutatta*), a model avian species, use two primary pigments: melanin and carotenoids. These pigments color their gray feathers and red bills, respectively. Zebra Finches fed environmentally relevant doses of methylmercury were measured at 3-week intervals to assess bill and feather coloration using a reflectance spectrometer, which measures the wavelengths of light reflected from surfaces. Because young birds undergoing development may be more sensitive than adults to the effects of mercury, birds were either dosed just during adulthood or during both development and adulthood. It is anticipated that mercury will decrease the color quality of both color patches and that this effect will be greater in developmentally exposed birds since their exposure occurs during the initial development of coloration pathways. Results will be discussed.

The Role of Irgm1 in Macroautophagy

Presenter: Maria Traver
Advisor: Gregory Taylor
Duke University,
Molecular Genetics & Microbiology

Immunity Related GTPases (IRGs) are a family of membrane binding proteins that regulate innate immunity through mechanisms that are unclear. Their importance to human disease is underscored by the association of genetic variants of IRGM with susceptibility to mycobacterial and Crohn's disease. A pivotal role for IRGM in these diseases is thought to relate to its hypothetical role in modulating macroautophagy, a function which we explored in the studies described here. We found that loss of Irgm1, a murine orthologue of IRGM, led to an up-regulation of the formation of autophagosomal structures. These structures frequently contained the IRG protein Irga6, as well as a protein from a related family, Gbp2; at the same time, they were also positive for the autophagic markers LC3, p62, and ubiquitin. Formation of similar autophagic structures was prompted by absence of the autophagy protein Atg5, or pharmacological blockage of autophagic flux. In contrast, induction of autophagy by means of starvation led to the clearance of these structures. Pull-down studies were performed to explore the roles of Irga6 and Gbp2 in formation of the autophagic structures, resulting in the finding that Irga6, but not Gbp2, was ubiquitinated through K63 linkages. Additionally, puromycin-induced protein aggregation lead to formation of compartments containing Gbp2, but not Irga6. Together, these and other data suggest that Irgm1 regulates a process through which ubiquitinated Irga6 is cleared from cells by an autophagic mechanism. Furthermore, Gbp2 appears to be involved in autophagic clearance independently of the IRG system.

Effects of Intraspecific Interaction with Floaters on Breeding Bald Eagles in the Chesapeake Bay

Presenter: Courtney Turrin
Advisor: Bryan Watts
College of William & Mary, Biology

Bald Eagle (*Haliaeetus leucocephalus*) populations suffered severe declines throughout most of the species' range until the banning of the organochlorine pesticide DDT in 1972. Since that time, the population of resident eagles in the Chesapeake Bay has been growing at an exponential rate. As eagles in the Bay rapidly approach carrying capacity, the proportion of floaters, or non-breeders, in the population is increasing relative to the number of breeders. Intraspecific intrusions by floaters onto breeding territories and subsequent behavioral responses were assessed during observational study of nest sites along the James River during the 2012 breeding season. The frequency of intraspecific intrusions close to the nest was higher than expected by random chance, indicating that intruders were drawn to the nest sites. Breeding pairs mounted a strong response to intrusion, characterized by chasing or attacking intruders, significantly more often when both breeding adults were present. The nest was guarded by both adults significantly more often than by a single adult, and nest guarding rates were significantly higher in the post-hatching stage when chicks are most vulnerable. Additionally, male breeders delivered food to the nest in 69% percent of observed provisioning events. Territorial intrusions by floaters may impact time budgeting of male breeders by altering the tradeoff between nest defense and provisioning to offspring. Thus, increasing floater to breeder ratios may affect productivity of breeding adults, thereby functioning as a mechanism stabilizing population growth rate.

Investigation of Two Proteins Involved in Cytoskeletal Dynamics of *C. elegans spermatozoa*

Presenter: Christopher Uyehara
Advisor: Diane Shakes
College of William & Mary, Biology

The ability of an organism to pass on genes to the next generation is the driving force of evolution. In males, this process requires the production of functional, motile sperm. In the nematode *Caenorhabditis elegans*, sperm motility is driven by dynamic polymerization of the Major Sperm Protein (MSP) which localizes to the pseudopod of mature, motile spermatozoa. MSP polymerization dynamics function analogously to actin based cell motility. However when MSP is first synthesized in developing spermatocytes, it is sequestered into Fibrous Body (FB) structures. Since the mechanism of FB formation as well as the mechanism of MSP polymerization remains unclear, I propose to explore the functions of two proteins that are involved in different stages of this process. Throughout meiosis, SPE-7 is involved in sequestering MSP into FBs. However, during the final meiotic division, SPE -7 also changes its localization pattern, suggesting some form of regulation. I plan to explore the mechanism of SPE-7 regulation, identifying post-translational modifications and binding partners. In addition, my research will explore the role of MFP-2. In *Ascaris suum* MFP-2 is known to function in pseudopod dynamics and recent work in the Shakes' Lab has revealed that MFP-2 is present in both the pseudopod and the FBs, but its precise role is unclear. This research will provide insights into MSP dynamics, which promises to expand our general understanding of cytoskeletal dynamics. In addition, this work has the potential to provide insight into nematode-specific targets for antihelminthic drugs.

Depuration of and Recovery from Mercury in European Starlings

Presenter: Margaret Whitney
Advisor: Daniel Cristol
College of William & Mary,
Biology

Mercury (Hg) is a global pollutant known to negatively impact the immune function and behavior of a wide variety of animals including birds. Little is known regarding if negative effects persist or how quickly Hg is eliminated from body tissues. We examined whether European Starlings (*Sturnus vulgaris*) can recover from chronic Hg exposure after the source of exposure is removed. Starlings were fed a diet containing 0ppm, 0.75ppm, or 1.5ppm Hg concentrations for 14 months, at which point half the birds in each group were sacrificed in order to analyze the Hg concentration in their pectoral muscle, brains, livers, and kidneys. Flight performance and immune function were measured in the remaining birds before they were switched to an uncontaminated diet. Blood was sampled weekly to monitor depuration of Hg from the blood. After five months when blood Hg levels had returned to baseline levels, flight performance and immune function were remeasured. The remaining birds were then sacrificed and their pectoral muscle, brains, livers, and kidneys were sampled to determine whether other tissues had returned to baseline levels. Preliminary data analysis indicates that previously contaminated birds remained immunocompromised compared to control birds, but may have shown signs of improvement since removal from contaminated foods. Flight performance and tissue levels will also be discussed. Based on the rapid elimination of Hg from blood and possible improvements in immune function, it appears some deleterious effects of Hg poisoning may decrease over time, but this is likely not true for all symptoms.

Synthesis and Fluorescence Studies of pH-Responsive Rhodamine B Derivatives

Presenter: William Czaplyski
Co-Author: G. Purnell
Advisor: Elizabeth Harbron
College of William & Mary, Chemistry

Rhodamines are a subclass of fluorescent xanthene dyes that can exist in two states, a colorless ring-closed spiro form and a highly-conjugated, fluorescent ring-opened form. *Rhodamine spirolactam* derivatives can be functionalized with specific sensor moieties to allow them to function as turn-on fluorescence sensors for acid, metal ions, oxidants, and other analytes. We report the synthesis of a series of pH-sensitive fluorescent dyes from rhodamine B and para-substituted anilines, which were selected to span a wide range of electronic properties, as given by their Hammett constants. The rate of ring-opening of the *rhodamine spirolactams* upon exposure to acid was studied by fluorescence spectroscopy. Correlations between the substituent Hammett constant and the properties of the dye were observed and suggest general applicability to the design of rhodamine-based pH probes.

Synthesis of 2-Pyridones from 2,5-Diketopiperazines

Presenter: Kaila Margrey
Co-Author: A. Hazzard
Advisor: Jonathan Scheerer
College of William & Mary, Chemistry

Pyridones are molecules that have been shown to possess several pharmacological and agrochemical properties. We report formation of 2-pyridones from 2,5-diketopiperazines by first accessing a [2.2.2]-diazabicyclic structure formed from a domino sequence involving aldol condensation, alkene isomerization, and hetero-Diels-Alder cycloaddition. Conditions to produce the cycloreversion were optimized to reveal the desired pyridone functionality. The reaction pathway has been investigated with different diketopiperazines, aldehydes, and alkynal components, involving both inter and intramolecular cycloaddtion templates. We are utilizing these conditions towards the natural product synthesis of biologically active molecules.

Microwave Effects on Chemical Reactions and Biological Systems

Presenter: Valerie Tripp
Advisor: Doug Young
College of William & Mary, Chemistry

In the past several years microwave irradiation has been exploited within synthetic chemistry to decrease reaction times while improving yields and purities for various organic reactions. This research set forth to investigate the application of microwave technology on an underutilized Glaser-Hay reaction. Using standard Glaser-Hay conditions with microwave irradiation, two terminal alkynes were coupled to generate various poly-ynes. Typically such reactions can require 10-48 hours of heating; however, the microwave-assisted coupling gives comparable yields after only 10 minutes of irradiation. Furthermore, when one terminal alkyne is immobilized on a polystyrene resin prior to irradiation, the reaction can be achieved with high levels of chemoselectivity, yielding the heterodimer poly-yne. The use of microwave technologies not only decreased the reaction time of this reaction, but also helped to eliminate tedious separations and workups. More recently microwaves have also been investigated with biological systems, including the activation of enzyme catalysts and hybridization of DNA. Microwave irradiation is thought to induce molecular motion as the dipoles within a sample align with the oscillating electromagnetic field. Given the large dipole moments present within many biomacromolecules, these systems should be highly susceptible to microwave effects. To this effect, microwave irradiation was successfully employed as a method to introduce exogenous DNA into *E. coli*, with efficiencies of ~10^5. This is the first reported example of using focused microwave irradiation towards bacterial transformations. This technique demonstrates the potential of biological systems for further examination in microwave-assisted experiments.

The Detection of Deception in Text Messages Streams using Supervised Learning

Presenter: Eric Cruet
Advisor: Aron Culotta
Georgetown University,
Communications, Culture and Technology

This project attempts to predict the veracity of text messages using predictive analytics based on two statistical supervised learning models: binary logit regression and tree classification. The combination of linguistic based cues and readability metrics will be used as the feature set. Basic programming will be used to extract these metrics from bulk messages posted between website users in a financial forum. The application tracks the source of text messages by User ID. The text messages are classified individually into truthful = "0" and deceitful ="1". The message data is pre-processed, concatenated, and analyzed by a word parser. After being scrutinized by an independent third party for an initial veracity assessment, it is subsequently submitted to the machine learning algorithms with a training set of data, in which we observe the outcome and feature set measurements for the given sample feature set. Using this data we build a prediction model, or learner, which will enable us to predict the outcome for the prediction data set. A good learner is one that accurately predicts such an outcome. The actual research yielded repeatable results with an 80.6% classification accuracy. The results have implications for future use of supervised learning in developing algorithms for the detection of identity, gender, and plagiarism detection. Further study can also explore the areas of creating textual signatures as a method of real time active security vs. the traditional challenge response mechanisms, which assume the identity of the user remains the same once the response has been authenticated.

Analyzing the Behavior of Honeybees using Image Processing Technique

Presenter: Ahmad Ghadiri
Co-Author: F. Barry
Advisor: Rahman Tashakkori
Appalachian State University,
Computer Science

Honeybees play a critical role in agriculture. They pollinate 80 percent of the crops in the world. Unfortunately in recent years a significant number of honeybees have died, mainly due to colony collapse disorder. Many studies have been conducted on this matter, but none of them has been able to fully explain the cause. Many factors affect honeybees' behavior. Two factors that have a significant effect on honeybees are temperature and humidity. To analyze the relation between these two factors and honeybees' health, we need to study the honeybees' behavior over a long period of time. The major challenge in observing honeybees resides in the fact that they work all day, which makes it impossible for a person to analyze their behavior without using an automated system. This research will provide a mechanism to obtain and analyze data about honeybees. The research aims to design and implement a fully automatic system which records, stores, and processes image data from a beehive. The system obtains temperature and humidity from national weather centers, and combines that with image data that is obtained from a camera installed on the beehive. The number of bees around the beehive is taken into account as an indication of the beehive's level of health. Several image processing algorithms will be developed in MATLAB to extract data from images once extracted from video recording of the beehive. After gathering data for a period of time, in the final step, the changes in number of bees during a recording period would be analyzed and correlated with the changes in temperature and humidity to determine how these two factors have affected the health of the beehive.

DozyAP: Power-Efficient Wi-Fi Tethering

Presenter: Hao Han
Advisor: Qun Li
College of William & Mary,
Computer Science

Wi-Fi tethering (i.e., sharing the Internet connection of a mobile phone via its Wi-Fi interface) is a useful functionality and is widely supported on commercial smartphones. Yet existing Wi-Fi tethering schemes consume excessive power: they keep the Wi-Fi interface in a high power state regardless if there is ongoing traffic or not. In this paper we propose DozyAP to improve the power efficiency of Wi-Fi tethering. Based on measurements in typical applications, we identify many opportunities that a tethering phone could sleep to save power. We design a simple yet reliable sleep protocol to coordinate the sleep schedule of the tethering phone with its clients without requiring tight time synchronization. Furthermore, we develop a two-stage, sleep interval adaptation algorithm to automatically adapt the sleep intervals to ongoing traffic patterns of various applications. DozyAP does not require any changes to the 802.11 protocol and is incrementally deployable through software updates. We have implemented DozyAP on commercial smartphones. Experimental results show that, while retaining comparable user experiences, our implementation can allow the Wi-Fi interface to sleep for up to 88% of the total time in several different applications, and reduce the system power consumption by up to 33% under the restricted programmability of current Wi-Fi hardware.

Enhancing Human-Computer Interaction Using Online Learning and Neurofeedback

Presenter: Andrew Holtzhauer
Co-Author: D. Graham
Advisor: Gang Zhou
College of William & Mary,
Computer Science

According to *The New York Times*, 5.6 million people in the United States are paralyzed to some degree. Currently there exist no medical solutions for paralysis. Researchers have attempted to use EEG headsets to aid paralyzed patients in controlling devices that support their mobility. However, training these algorithms is difficult because the user's brain activity may vary greatly during training and actual execution of the activity. In this paper we present an approach for dealing with this variation. In our proposed approach we use an online version of the k-means algorithm. We tested our results by having users control a small robot without training it beforehand. We compared our online training algorithm to other offline training algorithms.

Trace Estimation for Toroidal Lattices

Presenter: Jesse Laeuchli
Co-Author: K. Orginos
Advisor: Andreas Stathopoulos
College of William & Mary,
Computer Science

For large matrices, computing many functionals of their inverse directly can be computationally prohibitive. However, many applications require such functionals, and frequently resort to expensive Monte Carlo methods to obtain them. In our recent research, we have developed a variance reduction approach to speed up such methods. One approach when seeking to compute the trace of A^{-1} is to find the k-distance coloring of the corresponding graph of A. A valid k-distance coloring of a graph is one in which no nodes within distance k of each other have the same color. In many cases, elements of A^{-1} that are large in magnitude are connections between nodes that are close in the graph of A. This implies that capturing distances up to k approximates A^{-1}. Removing this approximation from A^{-1} speeds the convergence of Monte Carlo methods. We perform this by choosing random vectors that follow the coloring structure. Unfortunately, graph colorings are computationally expensive or memory intensive to produce. Further, if a given distance failed to provide an adequate trace approximation, the previous computations cannot be reused for higher distances. Our new method provides an alternative to this approach. We introduce an extremely fast method for generating hierarchical colorings for toroidal lattices. These colorings can then be used to generate a vector basis. Since this basis is hierarchical, should the estimate for the trace prove to be insufficient, additional vectors from the basis can be used to improve the estimate, building on previously completed work.

Application Performance Driven Auto-Tuning of Resource Control Settings for Virtual Datacenters

Presenter: Lei Lu
Co-Authors: E. Smirni, X. Zhu
Advisor: Evgenia Smirni
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Computer Science

Resource pools (RPs) and virtual datacenters (VDCs) are logical containers representing an aggregate resource allocation for a collection of virtual machines (VMs) being managed by VMware's cloud management software. Resource pools offer powerful resource control primitives including reservations, limits, and shares that can be set at a VM or a resource pool level. These primitives allow the administrators to control the absolute and relative amount of resources a VM or a resource pool consumes. However, as the virtual machine sprawl continues, it has become increasingly difficult to set these knobs properly such that virtualized applications (referred to as vApps) can get enough resources to meet their respective service level objectives (SLOs). In this paper, we present a tool called AppRM that automatically sets the resource controls for VMs and resource pools to meet the application SLOs. AppRM contains a hierarchy of vApp Managers and RP Managers, where a vApp Manager translates the SLO for an application into the resource control settings for the individual VMs running that application, and an RP Manager ensures that all the applications within the resource pool can meet their SLOs by adjusting the knobs at the RP level. Each vApp Manager consists of a model builder, an application controller, and a resource controller. Our experimental results demonstrate the effectiveness of AppRM by running one or more multi-tier applications under different hosting scenarios, and subject to different initial conditions or different workload variations. In all these scenarios, AppRM is able to deliver application performance satisfaction without manual intervention.

Private and Secure Location Proximity Sharing

Presenter: Edmund Novak
Advisor: Qun Li
College of William & Mary,
Computer Science

As the ubiquity of smartphones increases we see an increase in location based online services. Specifically, online social networks that allow users to share their current location information and provide location based services. For example, services that can recognize user co-location and the nearest neighbors. As a result, privacy is a strong concern. Location privacy in particular is very sensitive due to the possibility of physical harm and the subsequent information that can be easily extrapolated from users' locations. In this paper, we propose a method by which a user, Alice, can query the location (precise, GPS coordinates) of another user, Bob. In our system, Bob only shares his location if Alice is within a certain range of him. If Alice and Bob are near one another Alice learns this and is sent Bob's location. Bob learns only that Alice is near him and that he has been queried by her. If they are not near one another, Alice and Bob learn nothing. In any case the online social network provider, which is used for communication between Alice and Bob, learns only that a query took place. This is achieved by leveraging homomorphic encryption. Our main contribution is a practical protocol for private proximity testing, a useful and efficient technique for representing location values, and a working implementation of the system we design in this paper. It is implemented as an Android application with the Facebook online social network for communication between Alice and Bob.

RadioSense: Exploiting Wireless Communication Patterns for Body Sensor Network Activity Recognition

Presenter: Xin Qi
Co-Authors: P. Ge, Y. Li
Advisor: Gang Zhou
College of William & Mary,
Computer Science

Automatically recognizing human activities in a body sensor network (BSN) enables many human-centric applications. Many current works recognize human activities through collecting and analyzing sensor readings from on-body sensor nodes. These sensing-based solutions face a dilemma. On one hand, to guarantee data availability and recognition accuracy, sensing-based solutions have to either utilize a high transmission power or involve a packet retransmission mechanism. On the other hand, enhancing the transmission power increases a sensor node's energy overheads and communication range. The enlarged communication range in consequence increases privacy risks. A packet retransmission mechanism complicates on-body sensor nodes' MAC layer and hence increases energy overheads. In contrast to the sensing-based solutions, we build RadioSense, a prototype system that exploits wireless communication patterns for BSN activity recognition. Using RadioSense, we benchmark three system parameters (transmission (TX) power, packet sending rate, and smoothing window size) to design algorithms for system parameter selection. The algorithms aim to balance accuracy, latency, and energy overheads. In addition, we investigate the minimal amount of training data needed for reliable performance. We evaluate our RadioSense system with multiple subjects' data collected over a two-week period and demonstrate that RadioSense achieves reliable performance in terms of accuracy, latency, privacy, and battery lifetime.

Real time Wireless Data Acquisition and Monitoring for Apiology Applications

Presenter: Luke Rice
Advisor: Frank Barry
Appalachian State University,
Computer Science

Colony collapse disorder is a problem threatening the food security and economy of the entire world. Discovering the exact cause of CCD is particularly difficult because of the variety of colony locations and environmental variables. In addition, CCD instances do not tend to follow an easily recognizable pattern with respect to apiary conditions, which is exacerbated by the subjective nature of manual apiary data recording methods. Traditional off-the-shelf monitoring methods are typically too expensive for wide-scale deployment and often require manual collection of the data, reducing the quantity of data available for analysis. An automated approach to apiary monitoring was selected to reduce subjective interference and to explore issues related to general wireless data acquisition systems. The system was designed using base processing and wireless components as opposed to off-the-shelf data acquisition hardware to reduce cost. The acquisition system and data management tools were programmed and configured using freely available tools. Apiary data is transmitted to the Internet wirelessly in real time for storage and processing through a variety of backhaul mechanisms, including cellular GSM and Wi-Fi. Preliminary results show that it is feasible to build a general purpose wireless data acquisition system from individual components for apiology applications with similar capabilities to off-the-shelf components at a reduced cost allowing for potential wide area deployment.

Classification of Leaves from Images on Mobile Devices

Presenter: Matthew SeGall
Co-Author: J. Guin
Advisor: Rahman Tashakori
Appalachian State University,
Computer Science

Computer identification of plant leaves has been attempted by a number of algorithms. With the rise in the number and performance of mobile devices, identification can now be attempted from the field. This project works to optimize known algorithms of leaf identification for mobile computing as well as to improve upon the accuracy rate by adding statistical analysis. To optimize for mobile computing, the algorithms must be lean and run on the lower powered, lower performance processors. Statistical analysis will help improve accuracy by adding more data for comparison. Rather than focus on shape and color, the analysis will allow us to compare based on circularity, ellipticity, elongation, or other relevant stats such as degree of smoothness of the leaf edge. Techniques include, but are not limited to, image segmentation, shapelets, edge detection, computer vision, object recognition, neural networks, and GPU programming.

A Development Path for User Adaptive Software Interfaces

Presenter: Craig Sharp
Advisor: Jim Bowring
College of Charleston,
Computer Science and Information Systems

This independent study will show that it is possible to adapt a Web browser interface to the user's purposes, tasks, skill level, interests, and supporting hardware devices. It will also show that the same approach can be used to improve the functionality of the software interface in general for software packages made available over the Web and Internet. The programming and interface design concepts involved in user adaptability will be highlighted. The necessary ingredients that have already been developed as part of REST (Representational State) architecture will be evaluated as to what is the best choice from which to evolve the software interface to true user adaptability. The position taken by this paper is that user adaptable software is important and increasingly necessary due to the expanding base of users as participants in today's distributed ad hoc computer systems because the user base is less and less experienced as the user population increases globally and screen real estate continues to diminish while growing in complexity. Making user interfaces adaptable is an important goal for the software and hardware industry.

LBSNSim: A Trace-Driven Model for Online Location-Based Social Networks

Presenter: Wei Wei
Co-Author: X. Zhu
Advisor: Qun Li
College of William & Mary,
Computer Science

The soaring adoption of location-based online social networks (LBSNs) makes it possible to analyze human sociospatial behaviors based on large-scale realistic data, which is important to both the research community and the design of new location-based social services. However, performing direct measurements on LBSNs is impractical, because of the security mechanisms of existing LBSNs, and the high time and resource costs. The problem is exacerbated by the scarcity of available LBSN datasets, which is mainly due to the privacy concerns and the hardness of distributing large-volume data. As a result, only a very few number of LBSN datasets are publicly released. In this paper, we extract and study the universal statistical features of three LBSN datasets, and propose LBSNSim, a trace-driven model for generating synthetic LBSN datasets, which capture the properties of the original datasets. Our evaluation shows that the model-generated datasets are representative of the real datasets in a wide range of statistical features, and that the application-level results obtained by using the synthetic datasets closely match those obtained by using the original datasets. This validates the feasibility of using the model-generated datasets as replacements for real LBSN datasets.

Toward Fast Eventual Consistency with Performance Guarantees for Distributed Storage Systems

Presenter: Feng Yan
Co-Author: A. Riska
Advisor: Evgenia Smirni
College of William & Mary,
Computer Science

Systems have adopted the notion of eventual consistency which means that the targeted redundancy of data in the system is reached asynchronously, i.e., outside of the critical path of user traffic, so that performance of user traffic is impacted minimally. We propose a scheduling framework that makes decisions about when to schedule the asynchronous tasks associated with new or updated data such that they are completed as soon as possible without violating user traffic quality targets. At the heart of the framework lies a learning methodology that extracts the characteristics of idle periods and infers the average amount of work to be filled during periods of idleness so that asynchronous tasks are completed transparently to the user. Extensive trace -driven evaluation shows the effectiveness and robustness of the proposed framework when compared to common practices.

"SHE DRANK EMBALMING FLUID": Accidental Poisoning and the Crisis of Modern American Corpse Preservation, 1885-1900

Presenter: Kelly Arehart
Advisor: Charles McGovern
College of William & Mary,
History

In the last fifteen years of the 19th century, American newspapers reported an unusual phenomenon, death at a funeral. In cities all over the country, bereaved family members quickly joined their dearly departed as a result of mistaking embalming fluids for alcoholic beverages. While distressing to readers, these accidental poisonings proposed a larger crisis in burial preparation. Funeral Directors, armed with the latest technology in arterial embalming, could now preserve a corpse for an unprecedented period of time. The means by which embalmers could restore a healthy, serene appearance to bodies ravaged by age and illness threatened traditional notions of the living's safety and the dead's sanctity. Once fearful of human remains as an agent of pestilence, the American public now wondered about the embalming fluids that rendered corpses "inert". The caustic nature of Arsenic- (and later formaldehyde-) based fluids destroyed contagions and living human tissue in equal measure. But the unfolding paradox of preservation through destruction did not end with embalming fluids. The creation of an attractive appearance was invasive to both the corpse and the middle class household. The full cosmetic effect required multiple incisions, pumping blood from the body, and stuffing the corpse's orifices; all done within the deceased's home and in view of some family members. In the quest for a beautifully preserved body, families were ambivalent about sacrificing the sanctity of their homes and their loved ones' bodies. This ambivalence, I argue, was the real story behind the sensational newspaper reports.

The Massachusetts Mint: A Study of Evolving Imperial Relations in the 17th Century

Presenter: Jonathan Barth
Advisor: Cynthia Kierner
George Mason University,
History

The story of the Massachusetts mint (1652-1686) is one that is very much revealing of imperial relations in the 17th century English Atlantic world. Yet the historiography has remarkably little to say on the subject, and historians generally have long neglected money as an issue of cultural, economic, and political significance. Coinage had long been associated with the royal prerogative, with the stamped visage of the prince symbolizing sovereign power. In 1652 – with England embroiled in conflict – Massachusetts took the bold step of unilaterally founding its own mint. The coins made no mention of subordination to England: the money simply had a pine tree on one side and 'Massachusetts' on the other, symbolizing the colony's political autonomy and rise to economic prominence. Upon the Restoration, Charles II and his Privy Council regularly expressed great irritation toward the mint, insisting that the Massachusetts coinage represented an affront to English sovereignty. Beginning in the late-1670s, the Crown – to no avail – strictly ordered that Boston officials apologize for the mint, and coining finally came to an end with the Dominion of New England. The career of the Massachusetts mint reflected the dramatic evolution in the relationship between periphery and center in the three decades following the Civil War: a state of virtual autonomy at mid-century, mounting tensions between periphery and center after the Restoration, to sheer subordination by 1686. One implication of this project – besides rethinking the Massachusetts drama – is to encourage historians to explore money generally as a significant factor in history.

Exhorting or Extorting? The Financial Ministry of George Whitefield, 1737-1748

Presenter: Kristen Beales
Advisor: Christopher Grasso
College of William & Mary,
History

The English preacher George Whitefield's role in spreading revivals in Great Britain and the American colonies during the mid-18th century has long been debated among historians. However, the role of charity and fundraising in Whitefield's transatlantic itinerant preaching has not been studied in a systematic manner. I plan to examine Whitefield's financial ministry and charity work up through his second American tour in 1748. For sources, I use Whitefield's journals, sermons, letters, and pamphlets, as well as the newspapers and pamphlets written by his detractors. During Whitefield's first tour of the colonies between 1739 and 1741, he preached numerous charity sermons raising money for his Georgia orphanage. Although his English audience had criticized Whitefield for his finances beginning in 1737, it was not until 1742 that Americans began to question his motives. Although these critiques appeared at the same time as other attacks on his ministry, the critiques of Whitefield's finances were slightly different. I argue that instead of being provoked by discord at home, these questions were prompted by unsettling reports about the spiritual and temporal affairs of the orphanage. Critics adopted the orphan house as a tangible symbol of all that was wrong with Whitefield's ministry. The critiques of Whitefield's fundraising, described as being independent of authority and driven by emotional manipulation, echoed the commentary on his larger ministry. Studying Whitefield's financial ministry will reveal broader concerns about the intersection of money, charity, and authority in colonial America.

Shifting Alliances and Reconstructing Identity: The Bushmen in the South African Defense Force

Presenter: Shannon Browning-Mullis
Advisor: Cathy Skidmore-Hess
Georgia Southern University,
History

The Bushmen have been marginalized in southern Africa for centuries, both by European imperialists and other African groups. They have experienced exploitation, deprivation, and relocation in multiple areas and at the hands of various players. In 1974, a group of Bushmen was drafted into the South African Defense Force to fight in the Bush Wars. Guerilla groups, including SWAPO (the South West African People's Organization), were attacking Southwest Africa (Namibia) from Angola. The Bushmen were in a precarious situation. Some had no allies, no land of their own, and no way to provide for themselves and their families. Others had previously been allied to various groups including Portuguese imperialists. This research examines the ways structural, symbolic, and physical violence affected identity and decision making among the Bushmen in the South African Defense Force. My research draws on various sources including testimony to the Truth and Reconciliation Commission, newspaper articles from the war period, personal correspondence of South African military officers, and South African propaganda aimed at the Bushmen. A more thorough analysis of the limitations and options available to the Bushmen in this particular situation should present a more nuanced understanding of how they negotiated their circumstances and exercised their own agency to survive in an environment that often seemed completely out of their control.

Playing American: Toys in the Era of the American Revolution

Presenter: Amelia Butler
Advisor: Karin Wulf
College of William & Mary,
History

There is a certain perception of universality in childhood, a sense that some experiences transcend time, tradition, and circumstance. One particular manifestation of this feeling comes in the use of toys. Children play with toys—in some form or another, to varying degrees—in, as far as we know, all societies throughout history. Toys, as a significant part of children's material culture, provide a window into the socialization of children and the values adults attempt to instill in them in any given time and culture. By examining the toys advertised and present in the newly formed United States, it becomes clear that despite the political upheaval, the story of children's toys is largely one of continuity rather than disruption. By examining the form and origin of toys from 1750-1815, I have discovered little difference between pre-Revolutionary and early national toys. Portraiture, advertisements, and artifacts display a continuity of playthings through and after the Revolution. Toys continued to be imported from England, though the majority were homemade. My sources include surviving artifacts, period portraits, and newspaper advertisements. Few toys from this period survive, due to a lack of mass production, a use of perishable materials, and the onus of collecting being on adults. Portraits of children were becoming more realistic at this point and including more paraphernalia from their lives, though of course the symbolic nature of these should not be underestimated. Newspaper advertisements indicate what was being sold in stores, if not directly what was being played with.

Contexts and Pretty Pictures: The Hubble Space Telescope

Presenter: Giny Cheong
Advisor: Paula Petrik
George Mason University,
History

Since 1991, the Hubble Space Telescope has captured spectacular images that, for some viewers, evoke awe at the Creator's work and, for others, invite philosophical debate about humanity's role in the universe. While space images generally seem to inspire wonder, Hubble images especially gain religious meaning in examples such as "The Pillars of Creation" and the "Hubble Deep Field". This project will examine how various writers have appropriated these scientific images in both scientific arguments about evolution as well as other possible contexts for these images in the popular press. These diverse uses obscure the science and, instead, emphasize alternate meanings for particular audiences. The Hubble images also have also appeared in poster prints and coffee table books, a use emphasizing the images' aesthetic qualities over their scientific import. This phenomenon may help explain how astronomy images popularity in digital and print media does not translate into political support for further space exploration.

Functional Factions: Oral Histories of SNCC Women

Presenter: Anna Fowler
Advisor: Maian Mollin
Virginia Tech,
History

This paper argues that women in the national office of the Student Nonviolent Coordinating Committee (SNCC) served roles that were functional rather than subordinate, and these roles allowed them express power that women were gaining quickly during the Cold War Era. This work will show that women did not feel and were not subordinate to their male counter parts while working in the office. The majority of the information this paper is based on comes from extensive oral histories with women who worked in the Atlanta Office. These interviews were conducted by the author and supplement archival research also done by the author. Studying the role that women played in the Atlanta offices of SNCC offers a new insight to how women exercised their power within a social organization during the 1960's. This thesis seeks to explore the unique setting of the national office of SNCC through collections of oral histories and archival material. In many ways, this work explores the idea of service and how service in an office of a Civil Rights organization was just as crucial and vital as serving in the field. How did the organizational work that women in the office keep SNCC running like a well-oiled machine? How did the work allow women to grow politically? How does the roles that women played within SNCC during this time expand the traditional roles that women filled in previous generations? This paper seeks to answer all of these questions.

"Not Enough…for Really Intelligent Women": Domestic Science and the Elite Women's Colleges, 1890-1920

Presenter: Caroline Hasenyager
Advisor: Leisa Meyer
College of William & Mary,
History

This paper examines the controversial decision of the elite American women's colleges at the turn of the 20th century to reject the subject of Domestic Science (later Home Economics) and hold fast to the same traditional liberal arts curriculum in place at prominent men's institutions. In arguing that sex-specific training had no place in the undergraduate curriculum and strongly implying that Domestic Science could never be the intellectual peer of more established disciplines, the colleges appeared to confirm the growing suspicion that they were hostile to normative, domestic, womanhood, and bolstered their reputation as bastions of social privilege and academic snobbery. In a period fraught with anxieties over women's sexuality and their changing social, political, and economic roles, as well as more particular concerns that middle-class, native-born white women—the same demographic from which the colleges overwhelmingly drew their students—were not doing their part to maintain and extend American hegemony, the colleges' aversion to anything that savored too strongly of a "womanly" curriculum raised more than a few eyebrows and helped to lay the groundwork for the national backlash against them in the 1920s.

"My warriors are victorious over the Americans in every quarter": The Spanish-Creek Alliance and its Efforts to Combat the New Republic, 1784-1789

Presenter: James Hill
Advisor: Brett Rushforth
College of William & Mary, History

While the westward expansion of the United States is often presented as rapid and inexorable, it did not proceed as quickly as it could have. In the Southeast, the Creek Indians delayed or mitigated the effects of U.S. colonialism for a time by making recourse to a sparsely inhabited region of the Florida panhandle known as Apalachee. The combination of trade emanating from the Spanish posts of St. Marks and Pensacola and the availability of hunting grounds in Florida were a boon to Creek hunters and families contending with aggressive Anglo-American settlers and traders. Without it, Creeks may have succumbed to the pressures extending from the loss of land and cost of U.S. trade even sooner. Most importantly, Creek efforts show the extent to which they and other Native peoples could go to preserve their autonomy and sovereignty in the face of Euro-American colonialism.

The Palestine Exploration Fund and the American Palestine Exploration Society

Presenter: Ashley Irizarry
Advisor: Kathrin Levitan
College of William & Mary, History

In London, 1865, a group of British archaeologists established the Palestine Exploration Fund (PEF), an organization dedicated to the study and excavation of Palestine. The PEF's founders sought to remedy what they saw as a gap between spiritual familiarity with the lands of the Bible and scientific knowledge of the region. Inspired by the PEF, the American Palestine Exploration Society (APES) was founded five years after in 1870. The American Society stated similar goals and motivations; undertaking a scientific study of Palestine in order to provide evidence of the Scriptures and hence, improve spiritual understanding of the Bible. Although both organizations expressed a positivist, scientific methodology and motivation, religious faith framed their research, producing a latent tension in their work. Complicating this dynamic is the threat felt from Darwinian evolution and geological discoveries undermining Biblical calculations of the earth's age. Rarely were the PEF or APES explicit about a desire to refute scientists' attack on the Scriptures, the organizations saw themselves as engaging in scientific studies. For members of these organizations, faith and science were reconcilable. The question this thesis addresses is, how did the PEF and APES view this tension between faith and science and how did they attempt to resolve it? Was there a difference between the British and American organization in how they negotiated this tension? Analyzing the Palestine Exploration Fund and the American Palestine Exploration Society can reveal how scientific exploration and religious faith were conceptualized within late 19th century British and American society.

ARTS & SCIENCES

The Effectiveness of Aid Organizations in Liberia

Presenter: Kimberly Knipe
Advisor: Cathy Skidmore-Hess
Georgia Southern University,
History

The women of Liberia have suffered through harsh dictatorships and years of civil war spanning from the 1980s to the present. In many instances, they have lost their traditions, homes, pride, and self-worth. Through grassroots women's peace movements, the Liberian women have been able to take some of that agency back. Access to healthcare is a top priority for these movements. My research examines what healthcare means for the women of Liberia, both rural and urban, and how this definition changed pre, during, and post conflict. I will explore the healthcare policies of Liberian political structures, whether legitimate and illegal, since the 1980's. In addition to women's healthcare needs, I will examine how Non-Government Organizations define women's healthcare in Liberia and how this view has changed over time. Using records from the International Committee of the Red Cross as well as primary sources from rural women and the autobiographies of prominent urban women, I hope to determine the effectiveness of aid organizations as well as which health concerns remain. In this way, I will be able to determine if the international community and the women of Liberia place importance on the same aspects of healthcare, or if a disconnect exists between the two factions. Although women have begun to seek avenues to exercise their agency, there are still many healthcare concerns that need to be addressed. Examining the history of women's healthcare in the country is vital to addressing possible solutions for the future.

Attlee and Bevin's Post-War Imperial Delusion

Presenter: Jeffrey Levin
Advisor: Max Friedman
American University,
History

In the years following the conclusion of World War II, Great Britain's newly-elected Labour Party government faced critical decisions in all aspects of domestic and foreign policy. Chief among these was the impending crises in India and Palestine and how to handle the nearly-inevitable decolonization process. This paper argues that Attlee and Bevin, spurred by advice from the imperial-minded Cabinet, sought to maintain the British Empire in the Middle East against all evidence suggesting that Britain possessed neither the military nor financial wherewithal to do so. Only in the winter of 1947, when faced with a crippling energy crisis compounded by the escalation of Zionist terrorism and Arab intransigence, did Attlee and Bevin consider shirking their Mandatory duties. Using Cabinet documents, as well as the Attlee, Churchill, and Truman papers, this paper contends that Attlee and Bevin, products of an imperial upbringing, were unable to see past their delusions of re-establishing the British Empire to act rationally in assessing the condition of British possessions. Their failures contributed directly to the current, constantly inflamed situation in the Middle East.

Riots and Race: African-Americans during the Stamp Act Crisis

Presenter: Molly Perry
Advisor: Brett Rushforth
College of William & Mary,
History

In the Fall of 1765, colonists erected gallows with hanging effigies, crowds pulled down buildings, and funeral processions marched to mourn "Liberty", each action of protest demanded repeal of the Stamp Act and was calculated to influence an audience dispersed around the Atlantic basin. A significant, if unintended, local audience also witnessed these street spectacles – free and enslaved African-Americans. This paper examines street-level accounts of colonial riots to analyze the diversity of black responses across a variety of British colonial ports, highlighting questions of black agency and the contours of imperial hegemony. Slaves and free blacks constituted a significant and visibly distinct population within imperial ports from Boston to Basseterre. Sources carved a significant place for African-American participants and spectators that has not yet been fully examined by historians. Newspaper stories, official reports, and private correspondence depicted blacks alternatively as active protesters, inciters of violence, segregated spectators, or dutiful servants; each account vying for an imperial audience, creating fictions in the process. Overlaying these sources with an imperial perspective reveals precisely how authors manipulated local events to fit within cultural perceptions of blackness and violence. Debates over the legitimacy of crowd action echoes a wider debate shaping historical scholarship about the inherent radicalism of the Stamp Act riots and the meanings of these acts to contemporaries.

Emotion Baptized by Fire: Privileged Pain, Performed Cruelty, and the Hindu *Sati* in the Age of Sensibility

Presenter: Bill Smith
Advisor: Karin Wulf
College of William & Mary,
History

During the late 1780s and 1790s, Philadelphian elites attempted to create a refined urban space by removing acts of cruelty and pain. This included public punishment and executions; two long-established social tools in urban America. I believe this created a social void, which was filled by the theater—brought back to Philadelphia in 1789—the same year that the city performed its last execution of the 18th century. The theater offered performed pain as an educational device without the inherent negative aspects associated with witnessing authentic pain. Theatrical licenses were granted by the same political and judicial powers that helped remove cruelty and pain from the urban space. This is interesting, considering that licenses were given to plays such as *The Widow of Malabar* that incorporated the same sorts of cruelty and pain that were actively being removed and eradicated. Cruelty and pain had to exist as social tools, but they had to be culturally managed. Therefore, Philadelphia's theaters became "theaters of pain"—culturally managed locations where emotions could be cultivated and sympathy developed as part of a shared experience. I hope to demonstrate that the attempted removal of pain and cruelty—and the regulation of culturally managed, performed pain—was an expression of elite power as they attempted to achieve ruling authority and the passive, consensual improvement of Philadelphians' emotions. Only by situating these developments within the age of sensibility and the sentimentalization of the theater, can we understand the true extent of this expression of elite power.

The Evolution of Participatory Democracy in Jamaica

Presenter: Marc Thomas
Advisor: Craig Brians
Virginia Tech,
History

This study surveys the political history of Jamaica in order to understand how Parish Development Committees (PDCs) emerged and have been sustained. According to government reports, PDCs were initiated with the intent to offer the average citizen an opportunity to influence government policy. The research methodology of this study allows however for the unearthing of a richer and more complex account. This study employs the comparative historical approach which places emphasis on process over time and focus on comprehensive structures and large scale processes. This involved observing over one hundred hours of PDC activities and also conducting over fifty elite and focus group interviews with stakeholders (including many founding PDC members). In addition, there is a revisionist reading of Jamaica's political history that inserts the subaltern, who in this case is the black masses. Informed by the theories of James Scott in his seminal work *Weapons of the Weak* the project is equipped to highlight the subtle yet effective tools utilized by the underclass to survive and even thrive within oppressive structures. PDCs survive to this day, despite limited state support and in some cases overt obstruction. The citizenry utilize every tactic available to them, which includes embarrassing state representatives to gain support, finding international allies and using personal funds to keep the concept alive. The study concludes that emergence and survival of PDCs in Jamaica reflects a recent manifestation of a long history of emancipatory politics.

"Thus did God Break the Head of that Leviathan": Judicial Beheadings of Native Americans in 17th Century New England

Presenter: Ian Tonat
Advisor: Brett Rushforth
College of William & Mary,
History

This paper examines approximately seven judicial beheadings carried out in 17th century New England. These were the only executions carried out by decapitation in the history of the region and all were carried out on Indian men for acts committed during times of war. The executions are particularly interesting because they do not fit the normal criteria for execution by beheading in English law. The central question of this paper is: how can these beheadings be explained and what can they tell us about the relationship between English Colonists and Indians in New England in this period? By examining court records, accounts, and the diaries and writings of people present during the events and comparing them to English documents on law, beheading, and warfare, especially as these relate to Ireland, English people's first foray into colonialism and a place where beheading was extensively implemented, I conclude the beheaded Indians were categorized as rebels and English legal scripts surrounding treason and its punishment combined with military scripts sanctioning atrocities, trophy hunting, and unconventional punishments against enemies. This combination of scripts resulted in a form of judicial trophy hunting, showing that justice against a serious threat had been done and could be done again in order to reassure frightened colonists and strike fear into threatening Indians. This combining of scripts into a new form resulted due to the New England colonists' fears of Indian attack along with the precariousness of their society and their explicit attempts to reform English practices.

Conflict at the College: Faculty and Visitor Relations 1750-1776

Presenter: Andrea Williams
Advisor: James Whittenburg
College of William & Mary,
History

Located in the colonial capital of Virginia, The College of William & Mary was certain to have been affected by the rising political and social turbulence before the American Revolution; however, its location was not the major factor contributing to conflict at the College. The real source of tension was the difference in perspective between the Anglican clergymen serving as professors, and the Board of Visitor members who were gentry used to significant control over provincial affairs. From the 1750s to 1776, the Board of Visitors attempted to gain more local, secular control over the College, while faculty members used their connections to British administration to maintain their position in the face of Visitor opposition. This dynamic became apparent through the presidential elections, faculty dismissals and appointments, and statute revisions in which faculty ties to Britain allowed them to counter Visitor efforts to establish increased power over the professors. While the gentry on the Board of Visitors strove to laicize the administration, thereby severing William and Mary's Anglican bonds, the ministers acting as professors fought for the religious values of the school in the original royal charter. The firm reliance of the Anglican faculty on their British superiors protected them from Visitor interference, but kept them from adapting to an institution in a colonial setting that functioned very differently than British universities.

Understanding the NuMI Flux for MINERvA

Presenter: Leonidas Aliaga Soplin
Advisor: Michael Kordosky
College of William & Mary,
Physics

MINERvA (Main INjector ExpeRiment v-A) is an experiment dedicated to study the neutrino-nucleus cross sections using the NuMI (Neutrinos at the Main Injector) beamline located at Fermilab in Batavia, Illinois. To accomplish this task, MINERvA requires good knowledge of the neutrino flux. The neutrinos at NuMI come from the decay of mesons predominantly those that have been produced when 120 GeV protons collide with a thick target made of graphite. The flux determination is challenging because there are many sources of uncertainties that affect the production and focusing of the hadrons. Among them, the mayor uncertainty is the poorly known high energy hadronic interactions. In the last few years, experiments have been conducted to improve phenomenological understanding of those interactions and Monte-Carlo techniques needed to simulate them. In this presentation, I am going to show the status and current effort of MINERvA to determine the flux.

Thickness Dependence of Superconducting Properties in Magnesium Diboride Thin Films

Presenter: Douglas Beringer
Advisor: R. Ale Lukaszew
College of William & Mary,
Physics

Thin film MgB2 is a promising material currently researched for improvements in superconducting radio frequency (SRF) technology and applications. At present, bulk niobium SRF accelerating cavities suffer from a fundamental upper limit in maximally sustained accelerating gradients; however, a scheme involving multi-layered superstructures consisting of superconducting-insulating-superconducting (SIS) layers has been proposed to overcome this fundamental material limit of 50 MV/m. The SIS multi-layer paradigm is reliant upon implementing a thin shielding material with a suitably high Hc1 which may prevent early field penetration in a bulk material layer and consequently delay the high field breakdown. It has been predicted that for thin superconducting films — thickness less than the London penetration depth (~140 nm in the case of MgB2) — the lower critical field Hc1 will be enhanced with decreasing thickness. Thus, MgB2, with a high bulk Hc1 value is a prime candidate for such SIS structures. Here we present our study on the structure, surface morphology and superconducting properties on a series of MgB2 thin films and correlate the effects of film thickness and surface morphology on Hc1.

Tetraquark Bound States in the BB System

Presenter: Zachary Brown
Advisor: Kostas Orginos
College of William & Mary, Physics

The existence of tetraquark bound states in the system of two B mesons is studied via numerical simulation in lattice QCD. Two different methods are used to treat the bottom quarks, and the methods and results contrasted and compared. First, the bottom quarks are implemented in the non-relativistic static limit, and an interaction potential for the B meson pair is calculated as a function of separation distance. Using this potential, the two body Schrodinger equation is solved numerically to determine if it admits any negative energy (bound) states. A second calculation is performed using a fully relativistic fermion action for the heavy quarks. From this, the existence of bound states is determined by taking the difference between the energy of the two meson state and twice the single B meson energy.

Wavepacket Scattering by Oscillating Barriers

Presenter: Tommy Byrd
Advisor: John Delos
College of William & Mary, Physics

We present a detailed study of scattering by an amplitude-modulated potential barrier using three distinct physical frameworks: quantum, classical, and semiclassical. Classical physics gives bounds on the energy and momentum of the scattered particle, while also providing the foundation for semiclassical theory. We use the semiclassical approach to selectively add quantum-mechanical effects such as interference and diffraction. We find good agreement between the quantum and semiclassical momentum distributions. We also examine cases where multiple barriers are present, and explain a method which allows us to study this system topologically. Our methods and results can be used to understand quantum and classical aspects of transport mechanisms involving time-varying potentials, such as quantum pumping.

Precision Polarimetry in Measurements of the Proton's Weak Charge

Presenter: Juan Carlos Cornejo
Advisor: Wouter Deconinck
College of William & Mary,
Physics

The Qweak experiment at Jefferson Lab is measuring a fundamental property of the proton, namely its weak charge, through a measurement of the parity violating asymmetry of a polarized electron beam scattering off a hydrogen target. The expected uncertainty on the measurement of the asymmetry is 2.5%, with the beam polarization accounting for the single largest experimental uncertainty of 1%. To limit the uncertainty on beam polarization to within 1%, the Qweak experiment commissioned a new Compton polarimeter to be used in conjunction with the existing Møller polarimeter. This Compton polarimeter features a powerful laser and two independent detectors which detect the scattered electron and photon. During this talk I will speak about my work on the detection of the photons, and how we can expect to contribute a precise measurement for the Qweak experiment.

The g_2^p Experiment: A Measurement of the Proton's Transverse Spin Structure Function

Presenter: Melissa Cummings
Advisor: Todd Averett
College of William & Mary,
Physics

The proton's composition of quarks and gluons, which exhibit many-body interactions, make scattering from a proton significantly more complicated than a point-like particle. The four structure functions; F_1, F_2, g_1 and g_2, describe the deviation of a nucleon from point like behavior in an inclusive scattering experiment. These functions cannot be determined analytically, but instead must be determined experimentally. The last of these functions, g_2, is sensitive to higher twist effects and reveals the subtleties that arise from scattering an electron from a nucleon immersed in a transverse magnetic field. A measurement of this spin observable would provide insight on several physics puzzles, such as why Chiral Pertubation Theory calculations fail to predict the behavior of the longitudinal-transverse spin polarizability. They might also shed light on the Burkhardt-Cottingham Sum rule, which says that the integral of g_2 over certain kinematic variables tends to zero. This rule, while satisfied for the neutron, has yet to be verified for the proton, and has important ramifications in many-body nuclear interactions, such as QCD. In addition, although measurements of the hyperfine splitting of hydrogen have been made to very high accuracy, calculations of this quantity are only accurate to a few ppm with a leading uncertainty contribution coming from the spin structure of the proton. The g_2^p experiment ran in Hall A at Jefferson Lab in the spring of 2012. This talk will give an overview of the theory and experimental technique as well as present the current status of the analysis.

Inclusive Measurements with MINERvA

Presenter: Joshua Devan
Advisor: Jeffrey Nelson
College of William & Mary,
Physics

MINERvA is a neutrino scattering experiment at the Fermi National Accelerator Laboratory outside Chicago, Illinois. MINERvA is designed to measure neutrino cross-sections, final states and nuclear effects on iron, lead, carbon, liquid helium and water targets to reduce systematic uncertainties in neutrino oscillation experiments such as MINOS and NOvA. Neutrino scattering also provides a unique probe of the nucleus, complementary to electron scattering experiments, such as those at Jefferson Lab. The MINERvA detector is constructed of fine strips of solid plastic scintillator, allowing for tracking of individual particles and calorimetric energy reconstruction of particle showers. We present the latest results of the charged-current inclusive analysis, studying the interactions of neutrinos with the plastic scintillator of the MINERvA detector.

Measurement of $\Gamma(K^+) \rightarrow e^+\nu)/\Gamma(K^+ \rightarrow \mu^+\nu)$ and Search for Heavy Sterile Neutrinos using the TREK Detector System

Presenter: Bishoy Dongwi
Advisor: Michael Kohl
Hampton University,
Physics

The Standard Model (SM) of particle physics describes interactions of elementary particles and three of the four fundamental forces of nature. Included within the SM prediction is a highly precise value for the ratio of leptonic K^+ decay widths $R_K = \Gamma(K^+ \rightarrow e^+ \nu)/\Gamma(K^+ \rightarrow \mu^+\nu)$. The uncertainty of the SM value for this ratio is $\Delta R_K/R_K = 0.4 \times 10^{-3}$. The proposed experiment E36 at J-PARC uses stopped K + and the TREK (Time Reversal Experiment with Kaons) detector system to conduct a precision measurement of R_K. Any observed deviation from the SM prediction would yield clear indication of New Physics beyond the Standard Model. The aim is to achieve an uncertainty for RK of better than $\Delta R_K/R_K = 2.5 \times 10^{-3}$. The second portion of the experiment searches for heavy sterile neutrinos (N) in the $K^+ \rightarrow \mu^+N$ decay and allows for further stringent searches for light new particles as a byproduct. A Gas Electron Multiplier (GEM) subdetector-system has been proposed to be constructed for this experiment in order to measure charged tracks of μ^+ and e^+ from charged K^+ decay. I will present Monte Carlo simulations to determine the response function of the GEM detectors and design parameters such as geometry and resolution.

The γZ Box Radiative Correction to the Weak Charge of the Proton

Presenter: James Dowd
Advisor: David Armstrong
College of William & Mary, Physics

The recently completed Q_{weak} Experiment at Thomas Jefferson National Accelerator Facility will make the first direct measurement of the weak charge of the proton, Q_W^p, with a combined statistical and systematic precision of approximately 4%. This precision on Q_W^p is attained via a measurement of the parity-violating asymmetry in elastic electron-proton scattering at a forward angle with low four-momentum transfer. This will allow for an extraction of the weak mixing angle, $\sin^2 \theta_W$, to approximately 0.3% precision. In the Standard Model of electroweak interactions, the weak mixing angle is well predicted, so a precision measurement is a sensitive test of the model. To reach the high precision measurement goal of Q_{weak}, both quantum electrodynamic and electroweak radiative contributions to Q_W^p must be accounted for. The γZ box electroweak radiative correction to Q_W^p is ~8% at the nominal Q_{weak} beam energy of 1.165 GeV. The contribution to the Q_W^p uncertainty is model dependent and ranges from ~1% to ~3%. During the course of the Q_{weak} experiment, an opportunity presented itself to perform an ancillary measurement at a higher beam energy of 3.35 GeV. Inelastic electron-proton scattering is enhanced at this beam energy making the γZ box interaction more easily accessible. Analysis of these data will lead to an improved determination of the γZ box contribution to the weak charge of the proton, thereby validating the theoretical models used to predict this contribution.

Development of a Dual Quantum Gas Apparatus

Presenter: Charles Fancher
Advisor: Seth Aubin
College of William & Mary, Physics

We present progress on the development of an optical dipole trap for the rapid production of large atomic samples of ultracold Rb and K. This optical trap approach complements an existing atom chip method that produces Bose-Einstein condensates of ^{87}Rb of $3x10^4$ atoms with a cycle time of approximately 40s. The optical dipole trap is designed to be used in parallel with the atom chip to increase the quality and variety of experiments that can be performed with the apparatus. This optical trap method does not require the time-consuming macroscopic transport of the laser cooled atoms to the atom chip and can be cycled in approximately half of the time. The loading cycle for the optical dipole trap will start by loading the magnetic quadrupole trap from the MOT then turning on the laser and adiabatically ramping down the magnetic trap to transfer the atoms into the optical dipole trap. This optical dipole trap approach enables research on atomic clocks, gradient magnetometry, and ultracold molecule production by photo-association and Feshbach sweeps. These research opportunities using the optical dipole trap complement atom chip based work on RF trap development, atom interferometry, atomic clocks, quantum pumping, and 1-D many body physics.

Analysis of the Momentum Transfer from the Electron to the Proton in the Qweak Experiment

Presenter: Valerie Gray
Advisor: Wouter Deconinck
College of William & Mary,
Physics

The Qweak experiment at Jefferson Lab aims to determine the weak charge of the proton to a precision of 4% through parity-violating electron scattering off protons. Since the measured asymmetry is proportional to the squared momentum transfer from the incoming electron to the struck proton, uncertainty in the value of the momentum transfer contributes directly to the precision of the measurement of the weak charge. We used two independent drift chambers to reconstruct the electron trajectory through the experiment. One is located just after the target and the other is located after a magnetic field just before the final detectors. Using the tracks seen in both of these drift chambers the momentum transfer can be determined. Because we cannot know what the actual energy and momentum of the electron is right after scattering we must compare the experimental momentum transfer value with a simulated value. A Monte Carlo simulation of the Qweak experiment using Geant4 to determine the momentum transfer and its uncertainty. I will present my work on finding the momentum transfer for the Qweak experiment from data and using the Geant4 simulation. I will discuss the sources of uncertainty that contribute to and affect the value of the momentum transfer.

Quantum Enhanced Optical Magnetometry Using Squeezed Light

Presenter: Travis Horrom
Advisor: Eugeniy Mikhailov
College of William & Mary,
Physics

Precision measurements of small magnetic fields are widely used in applications such as biological, geophysical, and medical sensing. We demonstrate a quantum enhanced optical magnetometer based on the nonlinear magneto-optical Faraday effect in Rb vapor with the use of polarization squeezed states (PSS). We mix coherent light and quantum squeezed vacuum states in orthogonal polarizations to generate PSS. Squeezed vacuum exhibits non-classical noise properties such that the uncertainty in amplitude or phase quadrature can be lower than that seen in a natural vacuum state. Our squeezer is based on the polarization self-rotation effect in hot Rb vapor and exhibits noise suppression from a few hundred Hz to several MHz detection frequencies. Injection of PSS into a magneto-optical magnetometer provides broad-band noise reduction of close to 2 dB. We study the sensitivity and achievable noise suppression of the magnetometer at different atomic densities to identify the most favorable conditions for a quantum enhanced measurement. Our prototype experimental setup offers sensitivities down to ~1 pT/sqrt(Hz), and this method may be applied to other state of the art instruments for measurement improvements beyond the standard quantum limit.

Measurement of Helicity-Correlated Beam Systematics in the Qweak Experiment

Presenter: Joshua Hoskins
Advisor: David Armstrong
College of William & Mary,
Physics

The Qweak experiment at Jefferson Laboratory will provide a 5.1% measurement of the proton's weak charge using parity-violating electron scattering from a liquid Hydrogen target. The scattering rates into the detectors depend significantly on five electron beam parameters at the target: transverse position X and Y, angle X' and Y', and incident energy, E. Small helicity-correlated variations in these parameters produce false asymmetries which are enhanced by various broken symmetries in the apparatus. While great care was taken to suppress or eliminate helicity-correlated changes in beam parameters at the polarized source, we measured the detector sensitivities for first order offline correction of beam false asymmetries. To directly measure the detector sensitivities, we modulated the beam in (X,X',Y,Y') using pairs of electromagnets, and in E using an SRF cavity. We estimate a 10% precision measurement of the 5 beam sensitivities was possible each day of data-taking using only 1% of our total beam time.

Broadband Infrared Spectroscopy of Vanadium Dioxide Films Under the Influence of Strain

Presenter: Tyler Huffman
Advisor: Mumtaz Qazilbash
College of William & Mary,
Physics

Vanadium dioxide (VO_2) undergoes a phase transition between an insulating monoclinic phase and a conducting rutile phase. Even in this simple, stoichiometric material, a complete explanation of the phase transition has proved elusive. This transition, like phase transitions in other correlated electron systems, involves interacting electronic, lattice, and orbital degrees of freedom. This leads to physical properties that are particularly sensitive to small changes in external parameters such as strain. VO_2 films grown on different substrates are subject to differing strain effects that often lead to a shift in the transition temperature. Broadband infrared (IR) and optical spectroscopy allows us to examine the electronic structure and dynamics as well as IR-active, zone-center phonons of strained films grown on sapphire and quartz. Comparing and contrasting the IR and optical properties of these films, and those of bulk crystals, will provide insight into the influence of strain on the electronic and lattice degrees of freedom.

Development of an Atomic Quantum Pump: Investigation of a Bose-Einstein Condensate Scattering from an Oscillating Barrier

Presenter: Megan Ivory
Co-Authors: T. Byrd, K. Das, J. Delos, A. Pyle
Advisor: Seth Aubin
College of William & Mary, Physics

We present experimental and theoretical progress towards quantum pumping with a Bose-Einstein Condensate scattered from a single oscillating barrier. Quantum pumping is a proposed method for generating precise electron transport without applying an external voltage bias such as with a battery. Instead, localized time-varying potentials are used to generate an electron current through a circuit. Unfortunately, little progress has been made towards the experimental realization of such a mechanism due to spurious capacitive coupling and rectification effects in solid state systems. As an alternative, we are investigating the use of ultracold atoms to simulate quantum pumping. In addition to avoiding electromagnetic interactions, our ultracold atoms display a high degree of coherence, allowing us to study the quantum aspects of pumping in addition to the classical aspects. As a first step, we focus on measuring scattering from a single oscillating barrier potential. We have recently developed the theory for this type of scattering in classical, semi-classical, and quantum frameworks. We present progress towards testing this framework experimentally in a system of ultracold atoms.

Crystal Growth, Optical Spectroscopy, and Emission Cross-Section Modeling of Pr:$PbCl_2$ for 1.6um Gain Media Application

Presenter: Ivy Krystal Jones
Co-Authors: E.N. Brown, S.B. Trivedi
Advisor: Uwe Hommerich
Hampton University, Physics

The development of $Pr3^+$ doped crystals and glasses with low maximum phonon energies continues to be of current interest for eye-safe laser and optical communication applications. Recent developments in fiber and diode lasers operating in the ~1.5 µm region have enabled resonant pumping of Pr^{3+} doped crystals for possible laser applications the 1.6-1.7 µm region. In this work, results of the purification, crystal, and spectroscopic characterization of Pr^{3+} doped $PbCl_2$ are presented. The host material $PbCl_2$ is non-hygroscopic and has a low maximum phonon energy (~180 cm-1), which enables efficient emission in the infrared (IR) spectral region. Commercial $PbCl_2$ material was initially purified via vertical-directional freezing and/or zone-refinement. The crystal growth of the Pr^{3+} doped $PbCl_2$ was performed using vertical and horizontal Bridgman technique. The resulting Pr^{3+} doped $PbCl_2$ crystal exhibited characteristic IR absorption bands in the 1.5 µm region, which allow for resonant pumping using commercial diode lasers. A broad IR emission band centered at ~1.63 µm was observed under ~1.45 µm diode laser excitation with a bandwidth of ~75 nm (FWHM). The IR emission was assigned to the 3F3 → 3H4 transition of Pr^{3+} ions. Decay time studies revealed an average lifetime of ~350 µs at 40K, which decreased to ~160 µs at room-temperature. The temperature dependence of the lifetime suggests the existence of non-radiative decay through multi-phonon relaxations. The spectroscopic evaluation of Pr doped $PbCl_2$ as a gain medium for eye-safe laser applications will be discussed at the graduate research symposium.

Time-resolved Infrared Laser Induced Breakdown Spectroscopy for Chemical Detection

Presenter: Eric Kumi Barimah
Co-Authors: E. Brown, A.C. Samuals, S.B. Trivedi, C.S.C. Yang
Advisor: Uwe Hommerich
Hampton University,
Physics

Laser-induced breakdown spectroscopy (LIBS) is an innovative technique used to detect elemental composition in solid, liquids and gases in real time. This technique has been used for the detection of different materials such as explosives, pharmaceutical, biological samples and others in the UV-Visible-NIR. The extension of conventional LIBS to the infrared region (~1-12 μm) promises to provide additional information on molecular emission signatures due to vibrational transitions. In this study, a Q-switched Nd: YAG laser operating at 1064nm with 5ns pulse duration and repetition rate of 10Hz was focused onto several sodium compounds (NaCl, $NaClO_3$, and Na_2CO_3) to produce intense plasma at the target surface. The atomic and molecular emissions within the hot plasma were focused into the entrance slit of a 0.15m grating spectrometer and detected by a liquid nitrogen cooled Mercury Cadmium Telluride (MCT) detector. A gated detection scheme employing a boxcar averager was used to separate the continuum radiation in the plasma plume from the atomic and molecular IR LIBS signals. Intense atomic emission lines were identified from all the three sodium compounds at 4.66μm, 5.42μm, 7.42μm and 9.11μm, which correlate with assigned transitions of neutral sodium atoms published in the NIST atomic database. In addition, first evidence for broad-band molecular LIBS emission signatures was observed for $NaClO_3$ at ~10μm and Na_2CO_3 at 6.88μm and 11.53μm. The observed broad emission bands show strong correlation with FTIR absorption spectra of $NaClO_3$ and Na_2CO_3.

The NOvA Experiment

Presenter: Ji Liu
Advisor: Patricia Vahle
College of William & Mary,
Physics

The NOvA experiment is designed to search for oscillations of muon neutrinos to electron neutrinos by comparing measurements of the NuMI beam composition in two detectors, a near detector at Fermilab and a far detector 810 kilometers away. These neutrino oscillations occur because the flavor eigenstates are rotated with respect to the mass eigenstates. By observing muon to electron neutrino transitions, we measure the parameter θ13. Additionally, NOvA can begin to study the mass ordering and search for the effects of the CP violating phase δ. NOvA is particularly well suited to the study of the mass ordering due to the large amount of earth between the neutrino source and the detector. No other planned experiment can attack this problem. In this talk, I will review the capabilities of the experiment and current status of construction.

Measurement of the Proton Electric to Magnetic Form Factor Ratio with Polarized Beam and Target

Presenter: Anusha Liyanage
Co-Author: M. Jones
Advisor: Michael Kohl
Hampton University, Physics

Experiment E07-003 (SANE, Spin Asymmetries of the Nucleon Experiment) was carried out in Hall C at Jefferson Lab in 2009 to study the proton spin structure functions with a dynamically polarized ammonia target and longitudinally polarized electron beam. By detecting inclusively scattered electrons from the polarized ammonia target in the High Momentum spectrometer (HMS), elastic measurements were carried out in parallel. The elastic double spin asymmetry allows to extract the proton electric to magnetic form factor ratio G_E/G_M at Q^2 = 2.2(GeV/c)^2. To reach higher Q^2 than that of the inclusive data, elastically scattered protons were detected in the HMS in coincidence with electrons detected in a non-magnetic detector array, BETA. The beam-target asymmetry for elastic kinematics was measured to extract the G_E/G_M at Q^2 = 5.25 (GeV/c)^2 and Q^2 = 6.25 (GeV/c)^2. This method of measuring G_E/G_M allows to verify the dramatic discrepancy at high Q^2 between the Rosenbluth and the recoil polarization transfer method with a third independent measurement technique and systematic uncertainties uncorrelated to those of the recoil polarization measurements. The current status of the analysis and some preliminary results will be presented.

The Qweak Experiment: The First Direct Measurement of the Proton's Weak Charge

Presenter: Joshua Magee
Advisor: David Armstrong
College of William & Mary, Physics

After more than a decade of preparations and two years of data collection at Jefferson Laboratory, the Qweak Collaboration recently reported the first direct measurement of the proton's weak charge. Analogous to the familiar electric charge, which indicates how strongly a proton interacts with the electromagnetic force, the weak charge measures how strongly protons interact through the neutral weak force. Previous atomic parity-violating experiments have indirectly measured the weak charge, but are fraught by large theoretical uncertainties due to complex atomic structure. The Qweak experiment directly measures the asymmetry in parity-violating elastic electron scattering off protons in a pure liquid hydrogen target, leading to a theoretically cleaner result. This parity-violating asymmetry is proportional to the proton's weak charge and is therefore related to the weak mixing angle, an important parameter of the Standard Model of particle physics. The Qweak result ultimately will make the most precise measurement of the weak mixing angle at low energies. The current analysis has only included a small amount of the total data set, but after including the full data set the final uncertainty will be 4%. Regardless of whether the final measured value agrees with the Standard Model prediction, making such a precise asymmetry measurement places important constraints on emerging "new physics" theories and Standard Model extensions up to the TeV energy scale. The Qweak experimental methodology, apparatus, and preliminary results will be presented at a level appropriate for a general audience.

Lattice Study of Quark Distribution Amplitudes in the Pion and its Excitations

Presenter: Ekaterina Mastropas
Advisor: David Richards
College of William & Mary,
Physics

Lattice quantum chromodynamics (LQCD), which provides a nonperturbative way of studying phenomena within the theory of strong interactions, serves as a computational framework capable of predicting the spectrum of hadronic excitations from first principles. Our desire to describe the wealth of existing experimental data on the spectrum and to predict the outcomes of future experiments poses numerous challenges. For example, obtaining an accurate resolution of excited states using methods of LQCD is complicated due to the faster decay of excited-state correlation functions in Euclidean space in comparison with those of ground states, which we overcome through the use of anisotropic lattices with a finer temporal than spatial discretization. The aim of the project presented here is to go beyond the spectrum to discern the structure of the states through the computation of the quark distribution amplitudes for both the ground and excited pion states on improved anisotropic lattices developed by the Hadron Spectrum Collaboration. Application of so-called variational method which employs a large basis of interpolating operators satisfying the symmetries of the lattice allows us to extract the excited-state spectrum. When combined with undergoing parallel perturbative study of renormalization coefficients for quark bilinear operators, this work will enable us to explore the internal structure of the excited states, and to investigate the approach to a quark and gluon description of hadrons when probed at high-momentum transfers.

A New Algorithm for Characterization of Periodic Breathing in Preterm Infants

Presenter: Mary Mohr
Advisor: John Delos
College of William & Mary,
Physics

Background: Periodic breathing (PB) is a normal developmental phenomenon in neonates that, if exaggerated, may be pathologic. Characterization of PB has previously been limited to short monitoring times in small numbers of infants. Objective: Develop an automated system for measurement and characterization of PB. Design/Methods: All waveform (EKG, Chest Impedance, PulseOx) and vital sign (Heart Rate, Respiration Rate, SpO2) data were collected continuously on University of Virginia neonatal intensive care unit (NICU) patients from 2009-2012. A previously developed apnea-recognition algorithm, marking the time, duration, and probability of apnea vs. time was applied to the dataset. Frequency spectrum analysis of this signal as a function of time was performed and spells of periodic breathing were identified by the power in the frequency band (10-40 seconds per cycle) being at least five standard deviations above the mean found for typical apnea events. Results: There were 34 PB events found that lasted more than 80 minutes. These PB events occurred in 20 infants. One of these infants, who had 6 of these events, was an apparently healthy late preterm infant, who later died unexpectedly at home after being released from the NICU — a case of sudden unexpected infant death (SUID). Application of this new algorithm revealed that PB had occurred almost continuously throughout two weeks of the infant's stay in the NICU. Conclusions: Exaggerated PB may provide warning of impending pathology.

Temporal Resolution Limits on Laser Desorption Ionization

Presenter: Guangzhi Qu
Advisor: William Cooke
College of William & Mary, Physics

Since late in last century, laser ionized desorption is a widely used technique for molecular analysis such as peptides and proteins. Among those various mass analyzers, time of flight (TOF) analyzer is most commonly employed to record the entire mass spectrum under each single laser shot. Though the widely spread of TOF ionization technique, the mechanics which limits temporal resolution is not entirely understood. A new liquid chemical, RTIL, plays as matrices to study the limits on temporal resolution in our top down illumination laser TOF ionization system, providing a stable and self recovery surface when the conventional solid state matrix would be burned after laser exposures. From my current individual laser shot data, more ions are arriving at longer time with growth of amount of ion production whatever the ion mass is. Sharp cut-off structure either appears in peaks of the dominant specimen and species heavier. The curvature shape of both earliest and slowest ions in each specimen versus total ion production indicates the relationship between limit on mass spectrum temporal resolution and total ion counts under each single laser exposure. Ions cloud interaction simulation and multipole potential simulation models are raised to try to illustrate ions behavior.

Investigating Vanadium Dioxide Insulator-Metal Transition with Raman and Ultrafast Pulses

Presenter: Elizabeth Radue
Advisor: Irina Novikova
College of William & Mary, Physics

Most materials can be classified as an insulator or a metal, depending on their conductive properties. Metals allow electrons to flow through the material with little resistance, while insulators do not conduct electrons, as electrons are localized within the material. This affects the electrical and optical properties of a material. However, there is a class of materials that undergoes a phase transition, and changes from an insulator to a metal depending on their temperature. VO_2 has drawn interest due to the reversible insulator-metal transition that it undergoes just above room temperature at 154°F (68°C), where both its' lattice and electronic structure changes dramatically. VO_2 can also undergo such a transition when stimulated by an ultrafast optical pulse, leading to interesting technological applications, such as ultrafast optical switches, smart window coatings, and novel electronic devices. We have been studying the dynamics of the transition using a pump-probe configuration with ultrafast pulses. Current progress on probing this transition will be discussed. In addition, while heating the VO_2 films, we've studied the lattice structure with Raman spectroscopy. For both studies, we found that the substrate has a large effect on the shape of the transition, and the temperature at which it occurs.

Proton Charge Radius Problem

Presenter: Benjamin Rislow
Advisor: Carl Carlson
College of William & Mary,
Physics

The Lamb shift of electron orbitals in the hydrogen atom is caused by quantum field effects. A careful analysis of Lamb shift measurements using quantum field theory allows for an extraction of the proton's charge radius. It has long been a dream to perform a similar analysis using muonic hydrogen since muon orbitals are closer to the proton and more sensitive to its size. This dream was realized a few years ago and the experiment yielded a smaller proton charge radius than the previous electronic measurements. A possible explanation for the discrepancy is the existence of unaccounted for interactions (new physics) between the muon and proton that are being misinterpreted as proton size effects. If the electronic measurements of the proton charge radius are correct, these new interactions must lower the muonic Lamb shift by 310 μeV to agree with the experimental result. Proposals for new muon-proton interactions must also respect constraints placed by measurements of the muon's anomalous magnetic moment and kaon decay rates. We propose two models in which new particles possess fine-tuned couplings that respect all the constraints. The first model involves new particles with scalar and pseudoscalar couplings and the second involves new particles with vector and axial couplings. For the scalar-pseudoscalar model, masses between 100 and 200 MeV are not allowed. For the vector model, masses below 200 MeV are not allowed. We also interpret our vector model as a dark photon and predict its signal for upcoming kaon decay experiments.

Ground State of Double Layer Graphene Heterostructures in the Presence of Charged Impurities

Presenter: Martin Rodriguez-Vega
Co-Author: J. Fischer
Advisor: Enrico Rossi
College of William & Mary,
Physics

A graphene double layer heterostructure is formed by two sheets of graphene separated by a thin dielectric film. Using the Thomas-Fermi-Dirac theory we have studied the carrier density profile in the presence of charged impurities. In this talk I will present our results for the case of heterostructures formed by two sheets of single-layer-graphene (SLG) and two sheets of bilayer-graphene (BLG). As for isolated layers, we find that the presence of charged impurities induces strong carrier density inhomogeneities, especially at low dopings where the density landscape breaks up in electron-hole puddles. We find that the amplitude of the carrier density inhomogeneities in double layers can be much lower than in isolated layers due to the better screening properties of double layer systems. I will then present results for the case of "hybrid" structures formed by one sheet of SLG and one sheet of BLG.

Manipulation of Quantum Noise Using Rubidium Atoms

Presenter: Gleb Romanov
Co-Authors: T. Horrom, E. Mikhailov
Advisor: Irina Novikova
College of William & Mary,
Physics

In this work we study a way to manipulate quantum noise using Rubidium atoms. This can be useful in various experiments and devices, for example in gravitational wave detection and magnetometers. Specifically we look at propagation of special states of light called squeezed vacuum. Squeezed vacuum has very interesting properties, for example, allowing for the reduction of noise in an experiment below the Standard Quantum Limit (SQL). Squeezed vacuum is created by shining a laser into a glass cell containing Rubidium atoms and utilizing an effect called Polarization Self-Rotation (PSR). We then pass the squeezed vacuum through another Rubidium cell where the effect of Electromagnetically Induced Transparency (EIT) is created. EIT is an effect where one laser creates a window of transparency in a resonant atomic media for another laser. In our experiment EIT acts like a low-pass filter for squeezed vacuum, attenuating the noise of high frequencies stronger than low frequencies. An asymmetric EIT can also lead to the squeeze angle rotation. In my poster I will discuss our preliminary results on the experiment.

Non-Classical Properties of Second Harmonic Generation from a Whispering-Gallery Mode Resonator

Presenter: Matt Simons
Co-Author: E. Mikhailov
Advisor: Irina Novikova
College of William & Mary,
Physics

The advent of quantum information technologies (quantum cryptography, computation, etc.) demonstrate the need for methods of quantum information transmission. Light is a natural medium for this. Our lab is exploring the efficient generation of squeezed light, a state of light with quantum mechanical properties. We report on our experimental progress towards a source of bright squeezed light using a whispering-gallery mode resonator (WGMR). Previously we demonstrated a theoretical model of the noise properties of second harmonic generation inside a crystalline WGMR, which predicts a potential for noise reduction of up to 10 dB below the quantum shot noise limit. In this poster we will demonstrate stable second harmonic generation by thermally stabilizing and frequency locking our WGMR disk to a specific whispering-gallery mode. Additionally, the input laser (the fundamental field) modes of the whispering-gallery mode resonator do not necessarily coincide with the generated second harmonic (SH) field modes. In order to get the most efficient second harmonic generation, these modes should overlap. We will also demonstrate our progress in using the photo-refractive effect through a second, non-coupled 632nm laser to tune the relative frequency of the fundamental and SH whispering-gallery modes. With these methods in place, we will present our preliminary measurements of the noise properties of our generated second harmonic field.

Ab initio Many-Body Study of Cobalt Adatoms Adsorbed on Graphene

Presenter: Yudistira Virgus
Co-Authors: W. Purwanto, S. Zhang
Advisor: Henry Krakauer
College of William & Mary, Physics

Graphene, a two-dimensional honeycomb lattice of carbon atoms, has been the subject of intense research efforts in recent years. It combines exceptional mechanical strength, remarkably high electronic and thermal conductivities, and many other extraordinary properties. One potential application of graphene is for use in spintronic devices. However, external methods are required to induce magnetism on graphene, since pristine graphene is non-magnetic. One proposal is to adsorb transition metal atoms to provide localized magnetic moments in graphene. Co/graphene, in particular, has been extensively studied recently. However, these calculations show significantly varying results on the bonding nature of Co/graphene system. We use auxiliary-field quantum Monte Carlo (AFQMC) and a size-correction embedding scheme to accurately calculate the binding energy of Co/graphene. The calculated binding energy curve exhibits binding with a double-well structure for different spin states which open the possibility for magnetic switching by applied external fields, strain, gating, etc.

Bi-Chromatic Probing of the Metal-Insulator Transition in VO_2

Presenter: Lei Wang
Co-Authors: I. Novikova, J.M. Klopf, S. Madaras, G.P. Williams, E. Madras
Advisor: R. Ale Lukaszew
College of William & Mary, Physics

VO_2 is a correlated electron material that exhibits a metal-insulator (MIT) phase transition that can be thermally, electrically, or optically controlled. For the thermally-induced case the material undergoes a structural transition from a monoclinic insulating state to rutile metal at around 340K. The salient features of this first order phase transition are that upon the transition the material exhibits up to five orders-of-magnitude increase in conductivity and consequently also significant changes in the optical properties. Typically in these oxides, competing states can often coexist and form nano- or microscale domains of different phases while transitioning. Here we show that upon thermally inducing the MIT on epitaxial VO_2 films when simultaneously probed by two very different frequencies- namely IR and THz- the onset of the MIT appears at somewhat different temperature depending on the light used to probe it, thus confirming the coexistence of nano-scale domains of different phases. We will show our correlated far field optical and transport studies on these films to investigate the percolative nature of the transition and applied mean field approximations to model the observed response.

Cryogenic Infrared Reflectance Experiments

Presenter: Zhen Xing
Advisor: Mumtaz Qazilbash
College of William & Mary,
Physics

The dielectric function of various materials can be obtained by measuring their reflectance spectra. The dielectric function encodes information about the electronic structure and interactions, and lattice vibrations (phonons) in a material. I will report on the construction and testing of an ultra-high vacuum chamber for cryogenic, Fourier transform infrared (FTIR) reflectance experiments. Data analysis involves the development of a computer program which will process the reflectance intensity data using the Kramers-Kronig relations to obtain the phase shift and hence the real and imaginary parts of the dielectric function. The capability for infrared reflectance measurements at low temperatures will allow for the study of ordering phenomena and phase transitions in complex materials with strong interactions. Of particular interest are antiferromagnetic and superconducting transitions in systems with strong electronic and magnetic correlations, for example, the iron pnictides/ chalcogenides and the uranium-based heavy fermion materials.

The Effects of Annealing on the Infrared and Optical Properties of La0.67Sr0.33MnO3 Films

Presenter: Peng Xu
Advisor: Mumtaz Qazilbash
College of William & Mary,
Physics

La0.67Sr0.33MnO3 (LSMO) films grown by pulsed laser deposition on lanthanum aluminate substrates undergo a phase transition from ferromagnetic metallic state to paramagnetic insulating state at Tc ~ 350 K. This second-order phase transition proceeds via a phase coexistence regime over an extended temperature range. Annealing affects the strain and oxygen content in films thereby causing significant changes to the magnetic properties, electronic structure, lattice distortion, and possibly the nanoscale properties of coexisting phases. We use ellipsometry and Fourier-transform infrared spectroscopy to investigate the effects of annealing on LSMO films over a broad spectral range from ultraviolet to far infrared. We deduce the Jahn-Teller energy splitting and the Hund's coupling energy from our data on annealed and unannealed films. Our data analysis takes into account the morphology of the film as measured by an atomic force microscope.

Spatial Correlation of Squeezed Quantum Noise

Presenter: Mi Zhang
Co-Authors: C. Fancher, J. Soultanis
Advisor: Eugeniy Mikhailov
College of William & Mary,
Physics

We generated squeezed states of light (with quantum noise levels below the standard quantum limit or shot noise) with Gaussian and donut shaped pump beams utilizing the polarization self-rotation effect in hot Rb vapor. We present a detailed study of quantum noise suppression as a function of pump laser power, Rb atomic density, and position of the pump beam focus inside the atomic medium. We noticed that there was an optimal pump power and atomic density at which we observed squeezing around 2 dB. Further increase of the atomic density or power lead to strong modification of the output beam shape due to self-focusing of the output beam, which deteriorates the quantum noise suppression. We also explored the dependence of squeezing on the position and shape of the beam mask at the output of the squeezer and noticed a strong spatial correlation. For example, shielding of any part of the beam lead to degradation of the squeezing or even excess noise.

Development of Potassium Quantum Gases for Applications with Microwave and RF Potentials

Presenter: Austin Ziltz
Co-Authors: R. Endorf, M. Ivory, S. Parker
Advisor: Seth Aubin
College of William & Mary,
Physics

We present progress towards the development of microwave & radio frequency (u/RF) potentials using atom chip technology for novel trapping and interferometry of ultracold potassium atoms. Atom chips are capable of generating steep u/RF potentials that are inherently conservative and spin dependent and that can be combined with DC magnetic Feshbach resonances to tune atom-atom interactions. Trap dimensionality can also be continuously tuned from 1D to 3D. The theory of atom chip-based u/RF microtraps has led to a better understanding of atom chip potential roughness, which is suppressed by and RF selection rule as well as the characteristic shape of the deviations compared to equivalent micromagnetic DC chip potentials. Applications of spin-dependent u/RF potentials include high accuracy interferometry, isothermal sympathetic cooling and atomtronic devices as well as 1-D many body physics. We have completed a dual-species cooling, trapping and transport apparatus for the production of degenerate gases which includes an in-vacuum ‘chip stack’ instrument which allows for control of both DC and u/RF signals. The system is capable of producing Bose-Einstein condensates of up to 4 x 104 rubidium atoms, necessary for the sympathetic cooling of potassium to ultracold temperatures. Ongoing work to produce ultracold potassium atoms focuses on a microwave source for sympathetic cooling with rubidium as well as the appropriate configuration of cooling and pumping light.

Peer Perceptions of Adolescent Brokers: Social Network Position and Psychological Outcomes

Presenter: Sarah Borowski
Advisor: Janice Zeman
College of William & Mary,
Psychology

Brokers are crucial social network members who function as bridges between socially unconnected people. They connect separate people/groups that do not have contact except through the broker. Whereas brokers in professional networks tend to have positive peer evaluations, less is known concerning peer perceptions of adolescent brokers. In adolescence, certain peer perceptions are well-known to be associated with negative psychological outcomes; similarly, brokers are thought to be at-risk for increased stress, particularly females. Considering the importance of peer perceptions during adolescence and the potentially vulnerable position of brokers, the current study will examine peer perceptions of brokers within adolescent social networks, as well as the associated psychological outcomes. Data were collected from 943 high school students (Mage = 16.0 years, 51.0% male, 76.6% Anglo-Caucasian) from a larger NIH grant-funded project. Students' nominations of 3-10 close friends from a roster of students in their grade will be used to generate networks from which brokers will be identified. Peer perceptions will be determined from each participant's rating of 20 random peers as well as nominations of up to 7 "disliked" peers. Measures assessing psychological outcomes include the Behavioral Assessment for Children-2, Emotion Expression Scale for Children, and Louvain Loneliness Scale for Children and Adolescents. It is expected that peer perceptions of brokers will differ from perceptions of non-brokers and that brokers with certain peer perceptions will be at heightened risk for negative outcomes. Based on past research, these effects will be more prominent for female than male brokers.

Depressive Symptoms and Alcohol Related Problems: Religiosity as a Moderator

Presenter: Adrian Bravo
Advisor: James Henson
Old Dominion University,
Psychology

Heavy drinking among college students has been recognized as a major public health concern (*Hingson, Zha, & Weitzman*, 2009). Researchers have also found high rates of psychological distress among student populations, particularly depression (*Kushner & Sher*, 1993). The current study focuses on religiosity and its role as a moderator on the association between depressive symptoms and alcohol related problems. In the present study we hypothesized that, when controlling for alcohol consumption, individuals who are high in intrinsic religiosity have a weaker relationship between depressive symptoms and alcohol related problems. Further, we hypothesized that, when controlling for alcohol consumption, individuals who are high in quest religiosity would have a stronger relationship between depressive symptoms and alcohol-related problems. Thus far, we have obtained a sample of 176 (79% female) undergraduate students from Old Dominion University. Participants are taking an online survey that measures religiosity, depressive symptoms, alcohol related problems, and alcohol consumption. Preliminary analysis shows that intrinsic religiosity is a significant predictor of alcohol-related problems; however, there is not a significant interaction between depressive symptoms and intrinsic religiosity. Alternatively, quest religiosity was not a significant predictor of alcohol-related problems, and the interaction between quest religiosity and depressive symptoms is significant. These preliminary analyses indicate that religiosity, specifically quest religiosity, may have a significant impact on the relationship between depressive symptoms and alcohol related problems. This study indicates that future intervention studies may focus on the impact religiosity has on the relationship between depressive symptoms and alcohol related problems.

The Effect of Brand Names on Flavor Perception and Consumption in Restrained and Unrestrained Eaters

Presenter: Kevin Cavanagh
Advisor: Catherine Forestell
College of William & Mary,
Psychology

In an increasingly obesogenic food environment, making healthful food decisions can be complex. Because consumers are often bombarded with excessive information about foods they often rely on simple heuristics to decide whether to purchase or consume a food. In the present study we tested females who were either restrained (n = 33) or unrestrained (n = 33) to determine whether their perception and intake of a food would be affected by brand information. Participants were provided with in an ad libitum snack of cookies which was labeled with a brand typically associated with healthful snacks or a brand associated with unhealthful snacks. Results indicated that all participants rated the cookies with the healthful brand label as more satisfying and as having a better taste and flavor. Furthermore, restrained eaters consumed more of the healthful brand than the unhealthful brand, whereas unrestrained eaters' consumption did not differ. Thus it appears that food-related beliefs do influence consumers' intake, especially that of restrained eaters. Discussion focuses on the relative responsibility to which marketers have a social obligation to avoid misleading consumers and the degree to which health professionals need to educate consumers about their food choices and how the two factions may be able to work with one another. Further research is warranted to investigate these beliefs in order to improve recommendations for healthful eating in a society facing an increased prevalence of overeating and obesity.

Approach and Avoidance Temperaments Moderate Skin Conductance Response to Appetitive and Aversive Pictorial Stimuli

Presenter: John Dombrowski
Co-Authors: A. Elliot, A. Fuller, P. Kieffaber
Advisor: Todd Thrash
College of William & Mary,
Psychology

Approach and avoidance temperaments are conceptualized as neurobiological sensitivities to appetitive and aversive stimuli, respectively. In the current study, researchers seek to investigate these constructs with a new measure, the Approach-Avoidance Temperament Questionnaire -- Multiple Components (ATQ--MC). The new ATQ--MC has six sub-scales (three for each approach and avoidance temperament). Specifically, this study aims to validate the affective reactivity subscale of the approach temperament and avoidance temperament scales. Electrodermal activity (skin conductance response; SCR) will be recorded while a series of 144 images from the IAPS database are presented. Images were categorized according to content, arousal, and valence into five arousal-valence categories. Data will be analyzed in a multi-level model (MLM). For positive pictures, the within-person relation between picture arousal and SCRs is expected to be moderated (amplified) by approach temperament; for negative pictures, the within-person relation between picture arousal and SCRs is expected to be moderated by avoidance temperament. Preliminary pilot data indicate that approach and avoidance temperament may moderate quadratic rather than linear effects of picture arousal; accordingly, researchers will test moderation of both linear and quadratic effects.

Something New for Japan: Job Satisfaction Surveys

Presenter: Gregory Greer
Advisor: Doug Eyman
George Mason University, English

This article shall discuss, in ethno-poetic interview style, the focus group conducted at Hosei University in Tokyo, Japan, in November 2011, conducted as part of Mr. Greer's master's thesis research, among the four Industrial-Organizational Psychology (I/OP) -competent Japanese university professors recruited to accomplish the first ever forward-back translation of the famous Job Descriptive Index (JDI) surveys, i.e., the JDI/Job in General (JIG), the Abridged Job Descriptive Index (aJDI)/Abridged Job in General (aJIG), the Stress in General (SIG), the Trust in Management (TIM), the Scale of Life Satisfaction (SOLS), and the Retirement Descriptive Index (RDI), to/from Japanese. Following are the names and university associations of the professors recruited and interviewed: • Tomoki Sekiguchi, Ph.D., Osaka University • Yoichiro Hayashi, Ph.D., Hosei University • Tomohiro Nakagawa, Ph.D., Kinki University • Norihiko Takeuchi, Ph.D., Aoyama Gakuin University Teruchika Katsumata, Ph.D., International University of Health and Welfare, also participated in the focus group and offered criticism. Mr. Greer led the focus group, which resulted in 4 hours of speech that was later transcribed into over 40 pages of text. That text represents this article: the entire transcript, which demanded over 100 hours to complete.

Event-Related Potentials in Response to Smoking and Nonsmoking Cues Among Individuals with Previous Exposure to Parental Smoking

Presenter: Patrick Hammett
Advisor: Cheryl Dickter
College of William & Mary, Psychology

Recent research has identified the college age population as a demographic at risk for developing tobacco dependency. While previous research has demonstrated that a family history of smoking behavior can result in greater attentional biases towards smoking-related visual stimuli, the present study aims to elucidate this influence by examining event-related brain potentials (ERPs) following the presentation of smoking and nonsmoking stimuli. The early ERP components of N1, P2, and N2 were of primary interest due to their association with attentional cognitive processes. Smoking and nonsmoking stimuli were presented in a randomized sequence for a duration of eight seconds, with each cue followed by a blank inter-trial interval period of between 6 and 8 seconds. Analyses included data from forty college-aged female participants with smoking (FH+) (n = 19) and non-smoking parents (FH-) (n = 21). The FH- group exhibited a significant attentional bias to the smoking-related cues at the N1 component, and a marginally significant bias to the nonsmoking cues at the P2 component. Analyses of FH+ group amplitudes indicated a marginally significant attentional bias to the smoking cues at the P2 component, and a significant bias to the nonsmoking cues at the N2 component. These findings suggest that early exposure to parental smoking may cause differential cognitive processing of environmental smoking cues among young adults with family smoke exposure versus those without such exposure, and provide a foundation for future research addressing factors which may influence young adult smoking initiation.

Implicit Responses to Smoking Images After Exposure to Different Warning Label Types

Presenter: Anna Harris
Advisor: Cheryl Dickter
College of William & Mary,
Psychology

Previous research has shown that smokers tend to respond defensively to threatening, health-related smoking warning labels, leading to decisions to continue smoking (*Glock & Kneer*, 2009). The current study aims to compare nonsmokers', occasional smokers' (i.e., those who smoke less than 1 cigarette per day), and daily smokers' implicit responses to health-related and social/coping-related warning labels. Two hundred smokers recruited online will be randomly assigned to view a set of graphic health-related labels, text-only health-related labels, text- only social/coping-related labels, or text-only neutral control labels. Before and after viewing these labels, they will complete a measure of implicit affective responses toward smoking images, the Affect Misattribution Procedure, and a measure of implicit attention toward smoking images, the Dot Probe Task. We expect to find that social/coping labels will produce the largest changes in implicit affect and attention towards smoking-related cues, such that participants will direct more implicit negativity and less attention to smoking images. Because social/coping messages may be more salient to occasional smokers rather than daily smokers, we expect to see the strongest effects in occasional smokers compared to nonsmokers or daily smokers. Results of this study could have implications for current warning label policy, which relies entirely on threatening health-related messages, and could encourage future research on differences between warning labels in different smoking groups.

The Effect of Multisensory Integration on Emotional Recognition

Presenter: Jamie Klein
Advisor: Paul Kieffaber
College of William & Mary,
Psychology

Stimuli are perceived using multiple senses in the phenomenon of multisensory integration. Research has shown that multisensory integration can lead to enhanced sensory processes such as more rapid responses to stimuli, although the corresponding neural explanation has not been definitively established. In this study we sought to examine whether participants would demonstrate the effects of multisensory integration in a task that simulated an everyday skill: identifying another person's feelings, or emotional recognition. In this audiovisual task, participants were shown either a happy or sad face. Concurrently, participants heard tones that had been classified as eliciting happy, sad, or neutral emotions, or while hearing no tone. Participants identified each facial emotion as happy or sad. To confirm the tones' emotional resonance, the tones were played alone and participants identified whether the tone made them feel happy, sad or neutral. Participants were assessed using electroencephalography (EEG). We expect that participants will be able to accurately identify the facial emotion most quickly when it is shown with a congruent tone (e.g. a happy face with a happy tone), indicating that multisensory integration increases the speed of emotional recognition. In addition, using EEG measures, we expect to see a correlation between increased communication in brain regions involved in visual and auditory processing and facial/tonal identification. We hope to apply these findings to research in older populations, in order to study the enhanced effect of multisensory integration on emotional recognition when those senses are declining.

The Crossover Effects of Fathers' Attitudes on Mothers' Work Commitment and Work-Family Conflict

Presenter: Ralitsa Maduro
Co-Authors: M. Litano, D. Major, E. Oettinger
Advisor: James Paulson
Old Dominion University,
Psychology

The traditional perception of gender roles in American society is progressively fading to a more egalitarian view. However, mothers confronted with a partner's traditional attitudes may face greater struggles in managing work and family roles. This research examined the work-family conflict and work commitment of new mothers as influenced by fathers' attitudes. We predicted that when fathers had more traditional gender roles and negative views of maternal work's effects on children, mothers would experience greater work-family conflict and lower work commitment. The model in Figure 1 was tested using a subsample of longitudinal data from the NICHD Study of Early Child Care and Youth Development (SECCYD). The sample included 131 co-habitating mothers and fathers. The mean age of mothers was 29.66 (SD= 5.12), and fathers had a mean age of 31.50 (SD = 5.45). The majority of participants were Caucasian (95.45%) and married (95.4%). The hypotheses were examined in a fully-saturated (perfect fit) path analysis model, which was estimated with Mplus version 6.11 software. Path coefficients are presented in Figure 1. Fathers' attitudes explain a significant proportion variance in maternal work commitment, R2 = .21 and work-family conflict, R2 = .12. Contributing to the growing body of work-family studies examining crossover effects, these findings suggest that a father's attitudes crossover to influence the mother's work-family conflict and work commitment.

The Relationship between Well-Being, Meaning in Life and Cognitive and Physiological Reactions: A Day-Level Approach

Presenter: David Newman
Co-Authors: J. Dombroski, T. Thrash
Advisor: John Nezlek
College of William & Mary,
Psychology

Although research has shown there to be a positive relationship between spirituality and well-being, little research has explored within-person variation using experience sampling methods (ESM), a technique that measures individuals repeatedly across a period of time. Recently, an ESM study relying on self-reports found that meaning in life mediates the positive relationship between spirituality and well-being. The present study aimed to build on this growing body of research by measuring the cognitive and physiological reactions to positively and negatively valenced words and images in relation to daily levels of spirituality, meaning in life, and self-esteem. After completing a personality and life satisfaction questionnaire, participants completed an online questionnaire at the end of every day for 14 consecutive days measuring daily subjective levels of meaning in life, spirituality, positive and negative emotions, and self-esteem. During this time, participants also completed executive functioning tasks that measure accuracy and reaction time to emotional words and a task measuring skin conductance reactivity to emotional images. We anticipated finding daily levels of meaning in life to be associated with spirituality, self-esteem, and well-being as prior research has demonstrated. Additionally, we expected to find differences in cognitive and physiological reactions among participants, which should explain in greater detail the mediation between participants' levels of meaning in life, spirituality, self-esteem, and well-being. This study was novel in its design by measuring objectively measured cognitive and physiological data as part of an ESM study measuring these particular subjective levels of emotions and experiences.

Moderating Effects of Day Care on Cognitive Development of Male Children with Depressed Mothers

Presenter: Emily Oettinger
Co-Author: R. Maduro
Advisor: James Paulson
Old Dominion University,
Psychology

Perinatal depression is a public health problem in the United States and is problematic because care by depressed mothers is a documented risk for poorer cognitive outcomes in children. Multiple studies have found that day care is a protective factor for child cognitive development in low SES children, but few studies address how to protect children of depressed mothers from possible adverse outcomes. Therefore, this study focuses on child day care as a protective factor for the cognitive development of children with depressed mothers. METHODS: This study utilized data from the NICHD Study of Early Child Care and Youth Development. Participants were from 10 locations around the United States. Measures assessed postnatal depressive symptoms, child cognitive development, and day care quality. Postnatal depression was categorized into no depression and chronic depression based on the number of episodes, with 2-4 episodes denoting chronic depression. RESULTS: There was a significant interaction between care status and maternal depression, $F(1, 278) = 6.87$, $p = .017$, partial $\eta 2 = .009$. Cognitive scores for males with chronically depressed mothers who were cared for by their mothers ($M= 83.239$, $SE= 3.068$) were significantly lower than males with chronically depressed mothers cared for in day care ($M= 94.117$, $SE= 2.058$). DISCUSSION: Results indicated that day care acted as a protective factor for the cognitive development of males with chronically depressed mothers; males cared for in day care rather than at home by the depressed mother scored higher on a measure of cognitive development.

The Relative Contributions of Witnessing Parent and Peer Violence on Teen Dating Violence Perpetration

Presenter: Cristina Reitz-Krueger
Advisor: N. Dickon Reppucci
University of Virginia,
Psychology

Teen dating violence is a serious health concern in the United States affecting an estimated 15 to 40% of teens in their lifetime. Exposure to intimate partner violence (IPV) between parents has long been identified as a risk factor for experiencing teen dating violence (TDV), and more recent work suggests that association with peers involved in TDV is also a risk factor. Little research, however, has explored whether parent or peer violence is the stronger predictor of TDV involvement. The current data come from Project DATE, a longitudinal study assessing teen dating violence among at-risk youth. Participants were 212 low-income, service-receiving teens (59.4% female, 61.6% African American). Using a bootstrap method of analysis, we found that having friends who are involved in TDV is not only a stronger predictor of TDV perpetration, but that it fully mediates the relationship between witnessing parental IPV and perpetrating physical abuse with one's most recent partner. It may be that parental IPV by itself or in conjunction with other dysfunctional parenting practices sets children up for association with antisocial or aggressive peers who, in turn, exert a more direct influence on behavior. This study is one of the first to examine the relative contributions of parents and peers on TDV perpetration and suggests that if social learning and social norms are operating more strongly at the peer level, then that may be the most appropriate place to target attitude-based interventions.

Adult Attachment Styles and Self Regulatory Resources: A Dynamic Interplay

Presenter: Jonathan Renz
Advisor: Jeffery Aspelmeier
Radford University, Psychology

This purpose of this study is to test whether self regulatory resources are involved in the deactivating strategies utilized by individuals with dismissing avoidant attachment styles. After assessing participant's attachment styles, using the ECR-R (*Fraley, Waller, & Brennan*, 2000) and the RQ (*Bartholomew & Horowitz*, 1991), participants are randomly assigned to one of three essay writing conditions: the first activates the attachment system, the second depletes self-regulation resources, and the third acts as a control. Self-regulation depletion is assessed by measuring persistence on an unsolvable anagram task. It is expected that the essay type will have a significant main effect on self-regulatory resources regardless of participant's attachment style, with participants in the self-regulation depletion condition on average spending significantly less time on the persistence measure in comparison to the other two essay conditions. There are no expected differences between the other essay conditions and no predicted main effect for attachment style. A significant interaction between essay type and attachment style is expected, with simple effects revealing a significant effect of attachment style on persistence for participants in the attachment essay condition, specifically dismissing avoidant participants in the attachment essay condition will give up sooner on the self-regulation task in comparison to the other two attachment groups.

The Effect of Self-Esteem and Trait Emotions on Pain Sensitivity

Presenter: Gregory Shuler
Advisor: Lee Kirkpatrick
College of William & Mary, Psychology

Despite an abundance of research literature on pain sensitivity, there is a paucity of research in social psychology examining the relationship between pain sensitivity and psychological traits. The present research is designed to address this problem in two ways. First, the study is designed to examine empirical relationships between individual differences in pain sensitivity and emotional experiences at the trait level. A number of researchers have proposed that positive emotions reduce pain sensitivity whereas negative emotions increase pain sensitivity. Contrary to this broad hypothesis, but consistent with evolutionary hypotheses, we predict that some "positive" emotional traits will be associated with increased pain sensitivity while some "negative" emotional traits will be associated with decreased pain sensitivity when examined at the trait level. Second, the study is designed to examine the effect of various functionally distinct forms of self-esteem on these emotions and on pain sensitivity. Much recent research in social psychology has examined the relationship between pain sensitivity and social ostracism, with different research methodologies leading to different conclusions. The present research addresses this problem from a different angle by examining the relationship between pain sensitivity and various measures of self-esteem -- including self-perceived social inclusion, which represents (at a trait level) the opposite of feeling ostracized. Based on evolutionary reasoning we hypothesize that social inclusion self-esteem, but not other dimensions of self-esteem, will correlate negatively with pain sensitivity.

ARTS & SCIENCES

Hearing the Unseen: Personal Stereo Devices and the Acousmatic Experience

Presenter: Bradley Spiers
Advisor: Alessandra Campana
Tufts University,
Music

Since the introduction of the Walkman in 1979, personal stereo devices (PSDs), like iPods, Mp3 Players, and the Discman, have transformed the way that listeners experience the world. From an evolutionary standpoint, sound plays a vital role in a listener's understanding of space; while the perception of the visual plane is limited to what the eyes can see, the sonic plane provides a consistent 360 degree engagement with reality. With the emergence of PSDs, the listener willingly supplants the natural sounds of their environment for sounds that are artificially constructed—creating what I call an artificial soundscape. While many past studies on PSDs dwell on the isolation and detachment experienced by PSD users, I instead argue that the artificial soundscape enables a new audiovisual attachment, which renarrativizes the listener's everyday experience. With a PSD, the listener's perception of the visual plane is no longer mediated by the natural sounds of their environment, but instead, that perception is subjectively reoriented through the listener's cultural and personal relationships with the sounds (often music) emitted by the PSD. In this paper, I argue that this process cinematically renders the listener's everyday experience; no longer is their comprehension of reality shared with the collective, but instead they, according to Michael Bull, "construct the world narcissistically as a projection of their own 'mediated' sound world." (*Bull*, 2000) In effect, the subject is literally soundtracking their life, prompting a reorientation of their subjective reality that I call the "acousmatic experience."

Catalogue of Interventions to Promote a Family Systems Perspective

Presenter: Sydney Tafuri
Advisor: Michael Nichols
College of William & Mary,
Psychology

In the first phase of this process study, clinical judges set out to identify and define categories of therapist interventions that helped client families move from a linear perspective, in which problems are located in the family member, to an interactional perspective, in which problems are seen to involve other members of the family. Judges observed ten sessions with different families, conducted by three highly experienced systems-oriented family therapists. These sessions were used to compile a list of twenty-eight categories of intervention as well as to track the frequencies of these interventions. Interventions were identified as being questions asked to gather information or various forms of challenge, designed to shift families' views from a linear to a systemic perspective. Judges were able to reliably categorize interventions that challenged family members. In the second phase of this study, the clinical judges are examining whether these interventions are effective or ineffective at conveying the systemic problem to the families by looking at clients' immediate responses to the interventions and their overall change in perspective and willingness to change over the course of the sessions.

The Effect of Anxiety on Relations between Peer Victimization and Delinquency Among Adolescents

Presenter: Lisa Ulmer
Co-Author: T. Drazdowski
Advisor: Terri Sullivan
Virginia Commonwealth University, Psychology

Studies indicate that 20-32% of youth in the U.S. have experienced peer victimization (e.g., *CDC, 2012).* Victimized youths are at risk for increased frequencies of externalizing behaviors, including drug use and aggression (*Reijntjes et al., 2011*). General Strain Theory indicates that victimization experiences arouse negative emotions (e.g., anxiety), and that some youth may cope with these negative emotions by engaging in externalizing behaviors. This study examined the potential mediating effects of three subtypes of anxiety on relations between peer victimization and drug use and aggression. Anxiety is complex in youth and the role that different forms of anxiety play in explaining these relations is unknown. Data for this study was provided by 241 U.S. urban middle school students (52% female, 85% African American) in Fall 2010. They completed the Problem Behavior Frequency Scale which measured physical and relational victimization (alphas = .76 and .75, respectively), aggression (alpha = .91), and drug use (alpha = .85). Additionally, youths completed the Revised Children's Manifest Anxiety Scale which measured their levels of physiological anxiety (alpha = .73), worry and oversensitivity (alpha = .83), and fear and concentration problems (alpha = .70). After controlling for gender, regression analyses revealed that physiological anxiety and fear and concentration problems mediated the relations between both relational and physical victimization and aggression. However, no mediating effects were found for the anxiety subscales on relations between peer victimization and drug use. These findings can help inform future prevention and intervention models.

Comparisons of Sexual Health Behaviors and Practices in Minority Populations

Presenter: Dhymsy Vixamar-Owens
Advisor: Zewelanji Serpell
Virginia State University, Psychology

Adolescents and young adults of African-descent have the highest reported rates of STIs and unplanned pregnancy of any racial group in the US (*CADPH, 2009*). Yet Blacks adopt risk-preventative practices at higher rates than their non-Black counterparts (*CDC, 2008*). Failure to make distinctions between sub-groups within the larger "Black" racial category may account for this apparent paradox. There is evidence of differences among sub-groups (i.e. African-, Caribbean-, and America- oriented Blacks) in drug and alcohol use, diet and nutrition. However, virtually no research exists examining reproductive and sexual health (*Thamotharan, 2011*). This study investigates whether sexual health behaviors of Black young adults vary by subgroup, and if such differences are associated with psychosocial factors (self-concept, religiosity, social support). At present, 107 young adults (73% female; Mage=21, sd=3.22) completed a set of measures online, including a demographic questionnaire, Harter's Self-Concept scale, Hoge's Intrinsic Religiosity Scale, and the Multidimensional Scale of Perceived Social Support. Preliminary findings suggest significant differences in age of sexual onset ($F(2,101)=2.178$, p. 05), with American-oriented youth having the earliest (15 years-old). Data collection continues. As America becomes more diverse, cultural issues are becoming increasingly relevant. Thus, a better understanding of cultural differences within racial groups will have important implications. Specific cultural groups may warrant new and different approaches to addressing health-related issues. Findings from this study will help to establish the basis for such changes.

Jurors' Perceptions of Interrogation Evidence by Juveniles: Are Perceptions of Psycholegal Maturity more Relevant than Race?

Presenter: Todd Warner
Co-Author: A. Nagel
Advisor: Dick Reppucci
University of Virginia,
Psychology

Strong evidence exists to suggest that youthfulness is a dispositional risk factor that places juveniles at an increased risk for submitting false information during interrogation (*Owens-Kostelnik*, *Reppucci, & Meyer,* 2006; *Redlich*, 2007; *Redlich & Drizin*, 2007). In identified false confession cases, juveniles are disproportionately represented. *Drizin and Leo* (2004) reported 35% of identified false confession cases were provided by persons under the age of 18 and within that sample, more than half were under the age of 15. Of these proven false confession cases, nearly 75% were African-American juveniles. To date, there is little research on how jury-eligible members of the community think about developmental and racial issues for adolescents being questioned by police. Participants read one of six fictional vignettes about a juvenile being interrogated by police. Race and age were manipulated to examine their impact on jurors' perceptions of the juvenile's confession. Participants answered questions about their perceptions of the suspect's psycholegal maturity, the investigator's techniques, the voluntariness of the confession and the likelihood that the suspect was guilty of the crime. Older suspects were perceived as less suggestible and having better judgment and legal understanding. Although black juveniles were perceived as being more likely guilty, there were few race effects regarding legal competencies relevant to the confession. Finally, adolescent suspects' were perceived to have poorer psycholegal maturity compared to the young adult, suggesting that jurors do take into account developmental competencies when evaluating confession evidence given by juvenile suspects.

The Effects of Sex, Context, and Domain-Specific Self-Esteem on Aggression

Presenter: Joy Wyckoff
Advisor: Lee Kirkpatrick
College of William & Mary,
Psychology

The prevention or reduction of violence cannot be accomplished in the absence of a proper scientific understanding of the causes of aggression. The research literature on aggression, however, is largely focused on (1) male aggression and (2) physical or direct forms aggression; indirect aggression (e.g., spreading rumors, gossip), and aggression among women, have received inadequate attention despite being equally widespread. The present study draws upon two previous studies, one concerning self-esteem and aggression (*Kirkpatrick et al*., 2002), and one on context and gender-specific aggression (*Griskevicius et al.,* 2009). The former study showed that different, functionally distinct aspects of self-esteem were differentially predictive of aggressive behavior; the latter showed that gender and social context predicted difference in direct versus indirect aggression. The present study will replicate *Griskevicius et al.,* (2009) with the addition of the self-esteem scales employed in the *Kirkpatrick et al.,* (2002) study. Participants will read a scenario that primes a competition, courtship, or neutral mindset, and then will be instructed to imagine a scenario where they were publicly insulted. Subsequently, participants will respond to a series of questions regarding the likelihood that they would behave in various direct and indirect forms of aggression. The goal of the study is to determine the degree to which individual differences in self-esteem predict direct and indirect aggression in each scenario, and the degree to which these individual differences moderate the effects found in *Griskevicius et al.,* (2009).

Infusions of Orexin A into the Basal Forebrain Enhance Attentional Performance in Rats

Presenter: Kristin Zajo
Co-Authors: E. Wolfe, P. Yanev, K. Yonezaki
Advisor: Josh Burk
College of William & Mary, Psychology

Orexins are neuropeptides that are released in several brain regions including the basal forebrain, a region known to be crucial for normal attentional performance in rats. Our previous research demonstrated that infusions of orexin A into the lateral ventricle enhance attentional performance. The goal of the present experiment is to test whether the basal forebrain mediates the attention-enhancing effects of orexin A. Male FBNF1 hybrid rats were trained in a sustained attention task that required discrimination of visual signals from trials when no signal was presented. After stable performance levels were established, rats received guide cannulae implanted bilaterally into the basal forebrain. Postsurgically, rats were trained in a version of the task which increased attentional demands by presenting a visual distracter during the middle block of trials within a testing session. Rats then received 0 (vehicle), 0.1, 1.0 or 10.0pM orexin A prior to task performance. Each rat received each dose once in a counterbalanced order. Following vehicle administration, attentional performance decreased from block 1 to block 2, when the distracter was presented. This distracter-induced impairment in accuracy was attenuated following administration of higher orexin A doses. Future research in our lab will investigate whether these effects of orexin A are mediated by cholinergic and/or noncholinergic basal forebrain neurons.

Fuel Use Trends and the Solvency of the Highway Trust Fund

Presenter: Devin Braun
Co-Authors: R. Endorff, S. Parker
Advisor: Rui Pereira
College of William & Mary,
Public Policy

Since President Eisenhower's 1956 Federal-Aid Highway Act, a sizable portion of America's highway construction and maintenance projects have been funded by the federal Highway Trust Fund (HTF). In recent years, however, the all-important federal fuel taxes, last raised in 1993, have lost a great deal of purchasing power due to inflation and increasing fuel efficiencies. This trend has resulted in a funding gap between the HTF's revenues and America's federal highway commitments, forcing general revenues to make up the difference and expose taxpayers to unnecessary extra debt. For our project, we explored the revenue potential of alternative ways of highway financing. Namely, how much revenue could be obtained by simply indexing fuel tax rates to inflation? Furthermore, if fuel efficiencies continue to climb as spelled out in the CAFÉ standards, then a fuel gallon-based system of funding may become obsolete. We therefore explore the revenue potential of a federal Vehicle Miles-Traveled (VMT) tax system. Our project finds that correcting for both the deficiencies in a fixed tax rate scheme and a fuel tax scheme has the most long-term promise. A VMT tax indexed to inflation could bring the HTF significant amounts of additional revenue, but political and logistical concerns abound regarding the implementation of mileage tracking software in America's automobiles. More than anything, though, our project aims to start the conversation about alternative highway financing mechanisms as future federal highway reauthorizations and tax reform proposals are considered.

Absolutely Ambiguous: How Compromise Works in Daily Life

Presenter: James Crawford
Advisor: Elizabeth Hodges
Virginia Commonwealth University,
English

Compromise is a fundamental tenet of American history and American government. Yet, today, it seems strangely, significantly, absent in political behavior and discourse. Inspired by this odd transition, I examine how compromise works in daily American life. Compromise is often defined as two sides coming together and making concessions to resolve a dispute. However, a closer examination reveals complex nuances of meaning that affect how, or if, a compromise can be struck. In a historical context, a series of legislative compromises ultimately changed the outcome of the Civil War, but preserved slavery in the process. Recent literature shows that ambiguity, trust, and power dynamics impact negotiations of compromise. For instance, in his 2009 book "On Compromise and Rotten Compromises," Israeli philosopher Avishai Margalit says that any agreement based on threats cannot be a compromise. In their 2012 book "The Spirit of Compromise: Why Governing Demands It and Campaigning Undermines It," political scholars Amy Gutmann and Dennis Thompson argue that obstinacy and mistrust foment an uncompromising mindset which propagates the status quo. The impact of trust, power, and semantic ambiguity was revealed in a survey I conducted that asked respondents to tell stories of compromise in their lives. My analysis of the survey results suggests further research that might offer an improved understanding of compromise and, perhaps, begin its restoration to a more functional place in American government.

The Link Between Special Interest Groups and Partisan Politics

Presenter: Anthony Johns
Advisor: Paul McCartney
Towson University,
Social Science

The American political system is built on a two party dynamic in order to allow discussion and deliberation between policy makers of opposing views in order to arrive at a consensus that ideally would create laws that are palatable to all Americans. In recent years however, the increasing polarization of America's political parties has resulted in a system plagued with strife, hostility, spitefulness and gridlock. Coinciding with the rise in party polarization is the rise of the special interest group. Special interest groups have arisen for the sole purpose of advancing a specific cause through political activism, and achieve their goals through providing campaign contributions and blocks of voter to candidates who share their views and will work to see their goals met. The actions of these special interest groups have worked to create the party agenda within both political parties, which has in turn, has led to a decreasing willingness to come to a compromise. This paper recounts the rise of the interest group and explores the ways in which they influence decision making through analysis of the correlation between interest group ideology, campaign contributions, and party voting patterns on specific issues. Through this analysis it becomes increasingly clear that there seems to be a causal link between the increased activity of special interest groups and the escalating polarization in the current American political system.

Estimating the Value of Benefits Provided by the Lewis B. Puller Veterans Benefits Clinic

Presenter: Ian Mahoney
Co-Authors: K. Barrett, J. Petruzzelli
Advisor: Sarah Stafford
College of William & Mary,
Public Policy

When marketing to potential clients, donors, and partners, Veteran Services Organizations (VSOs) typically advertise the number of clients served and the amount of benefits won as valuation metrics for the work they have done. Through partnering with the Lewis B. Puller, Jr. Veterans Benefits Clinic (VBC) at the William and Mary Law School, this project develops a set of success metrics that take into account non-monetary benefits and uses those metrics to develop factsheets geared toward potential donors and partners; and state and federal legislators. These resulting factsheets represent a step forward in presenting the values of benefits provided by VSOs. Additionally, the researchers developed a comprehensive client intake form to enable the VBC to build upon the valuation model for which the foundation was laid in this project.

Mediating Federal Meetings

Presenter: Jaclyn Petruzzelli
Co-Authors: W. Ginsberg, J. Straus
Advisor: Elaine McBeth
College of William & Mary,
Public Policy

Recently the federal government has promoted the use of teleconferencing, or similar technology, to replace in-person meetings for federal employees. Despite pressure from both Congress and the President, movement toward mediated meetings has been sporadic. Using data from Federal Advisory Committees, this study highlights some factors, including total costs and committee size, that may prompt committees to hold meetings via technology as opposed to in person. Comparing our regression results to existing literature from the private sector, we are able to draw attention to some limitations of the use of teleconferencing within the federal government. These limitations may be of interest to legislators as they continue to advocate for the movement toward mediated meetings.

Notes

ARTS & SCIENCES

Notes

ARTS & SCIENCES

Index of Presenters

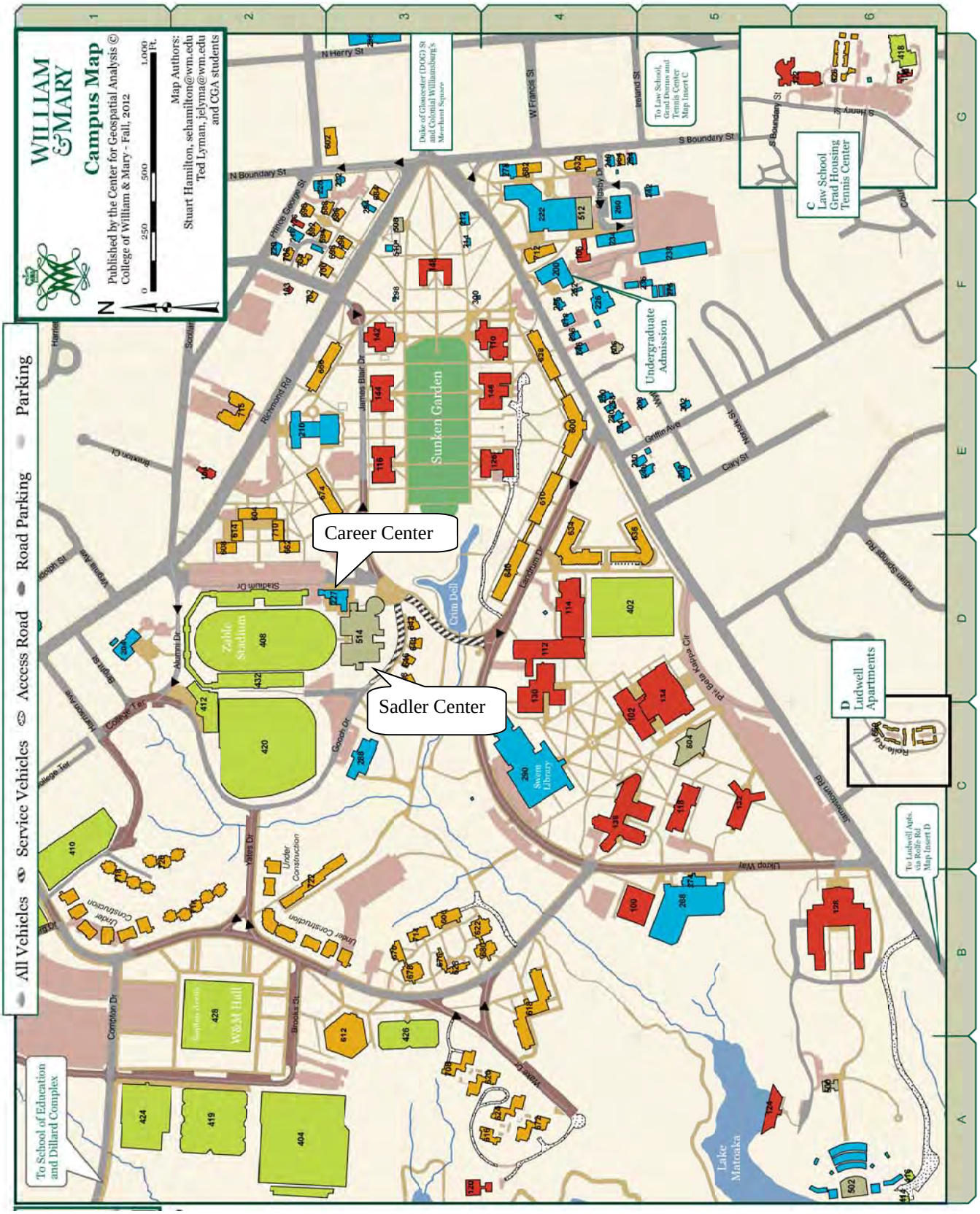
ARTS & SCIENCES

Index of Presenters

WM ARTS & SCIENCES

Index of Presenters

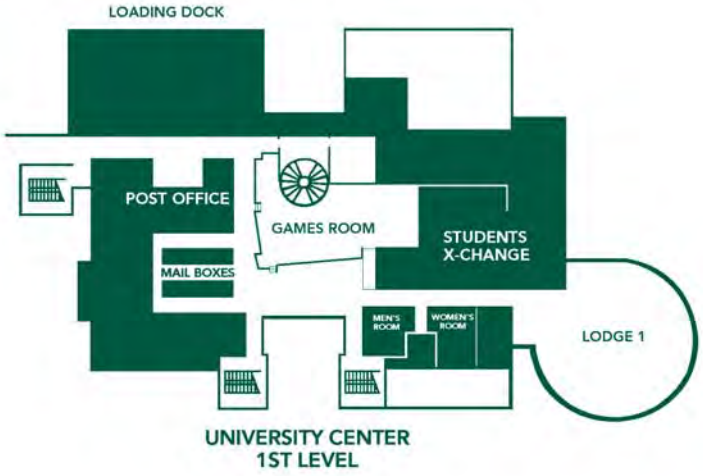
ARTS & SCIENCES

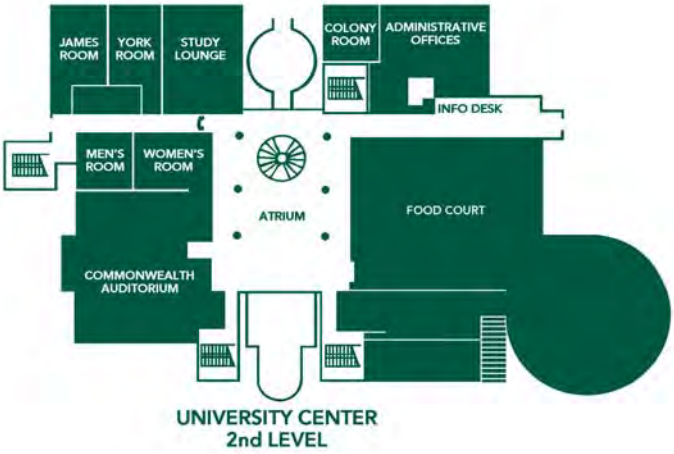

WILLIAM & MARY
Campus Map
Published by the Center for Geospatial Analysis © College of William & Mary - Fall, 2012
Map Authors: Stuart Hamilton, schamilton@wm.edu Ted Lyman, jelyma@wm.edu and CGA students
All Vehicles
Service Vehicles
Access Road
Road Parking
Parking
Career Center
Sadler Center
Undergraduate Admission
C Law School Grad Housing Tennis Center
D Ludwell Apartments
Sunken Garden
Zable Stadium
Crim Dell
Swem Library
W&M Hall
Lake Matoaka
To School of Education and Dillard Complex
To Ludwell Apts. via Rolfe Rd Map Insert D
To Law School, Grad Dorms and Tennis Center Map Insert C
Duke of Gloucester (DOG) St and Colonial Williamsburg's Merchant Square
N Boundary St
S Boundary St
Jamestown Rd
Richmond Rd
Ukrop Way
Under Construction

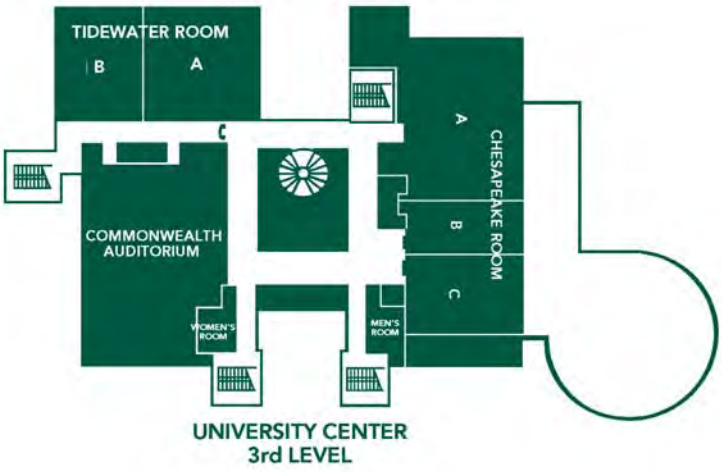
MAP#	BUILDING	GRID
	ACADEMIC	
100	Adair Hall	B4
102	Andrews Hall	C5
	Blow Memorial Hall (#210)	E2
103	Bozarth Garage	F2
104	Ctr. for Archaeological Research	E2
106	Ceramics Studio	F4
108	Endocrinology (Pop) Lab.	Ins C
110	Ewell Hall	F4
112	ISC1 (Integrated Science Ctr.)	D4
114	ISC2 (Integrated Science Ctr.)	D4
116	James Blair Hall	E3
118	Jones Hall	C5
120	Keck Environmental Field Lab	A3
122	Law School	Ins C
124	Matoaka Art Studio	A5
126	McGlothlin-Street Hall	E4
128	Miller Hall	B6
130	Millington Hall	C4
132	Morton Hall	C5
134	Phi Beta Kappa Memorial Hall	D5
136	Prince George House	F2
138	Small Hall	C4
140	School of Education	Ins B
142	Tucker Hall	F3
144	Tyler Hall	E3
146	Washington Hall	E4
148	Wren Building	F3
	ADMIN & SUPPORT SERVICES	
194	Western Union Building	F3
200	Admission (Undergraduate)	F4
202	Alexander Galt	Ins A
204	Alumni House	D1
206	Bell Hall	E5
208	Blank House	E5
210	Blow Memorial Hall	E2
212	Brafferton	F3
214	Brafferton Kitchen	F3
216	Braxton House	F2
218	Bridges House	F4
220	Bull House	F2
222	Campus Center	F4
226	Child Care Center	F4
227	Cohen Career Center	D3
228	College Apartments	G2
230	Corner House	E5
232	Davis House	G3
	Ewell Hall (#110)	
234	Facilities Mgmt. Admin.	F4
236	Facilities Mgmt. Annex	F5
238	Facilities Mgmt. Shops	F5
240	Facilities Safety	G5
242	Facilities Supervisors	G5
244	Gabriel Galt	Ins A
246	Graduate House	F4
248	Grigsby House	E5
250	Holmes House	E4
252	Hoke House Annex	F4
254	Hornsby House	E4
256	Hoke House	F4
258	Lambert House	E4
	Law School (#122)	Ins C
260	Main Power Plant	F4
266	Minson Galt	Ins A
267	Mt. Vernon Complex	Ins B
268	Parking Deck	B5
270	Patrick Galt	Ins A
272	Patrick Galt Annex	Ins A
274	Police and Parking Services	B5
276	Quonset Huts	F5
278	Reves Center	G4
280	Rowe House	E4
282	Savage House	D1
284	School of Leadership Institute	G4
286	Stetson House	F4
288	Student Health Center	C3

MAP#	BUILDING	GRID
290	Swem Library	C4
292	Swem Off-Site Storage	Ins A
296	W&M Bookstore	G3
298	Wren Outbuilding North	F3
300	Wren Outbuilding South	F3
302	Young House	E5
	ATHLETICS & ATHLETIC FIELDS	
400	Albert-Daly Field	Ins A
402	Barksdale Field	D4
404	Busch Field	A2
408	Cary Field	D2
409	Dillard Practice Fields	Ins A
410	Intramural Fields	C1
412	Laycock Football Center	C2
413	Martin Family Stadium	Ins A
414	Matoaka Boat House	A6
416	Matoaka Boat House 2	A6
418	McCormack-Nagelsen Tennis	Ins C
419	Millie West Tennis Facility	A2
420	Montgomery Field	C2
422	Plumeri Park	Ins A
424	Rec Sports Center	A1
426	Tennis Courts	B3
428	W&M Hall & Kaplan Arena	B2
432	Zable Stadium	C2
	ARTS & EVENTS	
	Alumni House (#204)	
500	Amphitheatre Ticket Office	A6
	Campus Center (#222)	
502	Lake Matoaka Amphitheatre	A6
504	Muscarelle Museum of Art	C5
	Phi Beta Kappa Memorial Hall (#134)	
506	Plumeri House	F4
508	President's House	F3
510	President's Guest House	F3
512	Trinkle Hall	F4
514	Sadler Center	D3
	W&M Hall & Kaplan Arena (#428)	
	Wren Building (#148)	
	STUDENT HOUSING & SERVICES	
600	Barrett Hall	E4
602	Brown Hall	G3
604	Bryan Hall	E2
606	Cabell	B3
608	Camm	D2
	Campus Center (#222)	
610	Chandler Hall	E4
612	Commons Dining Hall	A3
614	Dawson	E2
616	Dinwiddie	A4
618	Dupont	B4
620	Fauquier	A4
622	Giles	B4
624	Gooch	A4
626	Graduate Housing	Ins C
628	Harrison	B3
630	Hughes Hall	Ins A
632	Hunt Hall	G4
634	Jamestown North	D4
636	Jamestown South	D4
638	Jefferson Hall	F4
640	Landrum Hall	D4
642	Lodge 2: The Daily Grind	D3
644	Lodge 4	D3
646	Lodge 6	D3
648	Lodge 8	D3
650	Lodge 10	D3
652	Lodge 12	C3
654	Lodge 14	C3
656	Lodge 16	C3
660	Ludwell Apts: 100-700	Ins D
662	Madison	D2
664	Meridian Coffee House	G4
666	Monroe Hall	E3
668	Munford Hall	Ins A
670	Nicholas	B3

Meeting Space at the Sadler Center







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