

4TH ANNUAL  
**2016 LSMCE**  
**C O N F E R E N C E**

*Prism of Possibilities: Focus on the Future*

October 28-29, 2016

Hyatt Regency Lisle

Lisle, Illinois

[ismceconference.org](http://ismceconference.org)



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The Louis Stokes Midwest Center of Excellence (LSMCE) Annual Conference, Prism of Possibilities: Focus on the Future, is supported by the National Science Foundation award #1202563.

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28 October 2016

Dear Conference Attendees,

On behalf of Chicago State University, Indiana University-Purdue University Indianapolis, and Argonne National Laboratory, we welcome you to the Fourth Annual Louis Stokes Midwest Center of Excellence (LSMCE) Conference. This year, we bring you to Chicago to learn about and reflect on the many *Prisms of Possibilities* in Science, Technology, Engineering and Mathematics (STEM).

As we convene this weekend, we acknowledge the mission of LSMCE and honor our commitment to expand the talent pool of underrepresented minorities (URMs) in the areas of STEM. Our program and invited speakers bring valuable insight into promoting STEM programming and providing quality opportunities for students and faculty. The conference also presents students with a platform to showcase their research—gaining confidence and experience along with high quality assessments from leaders in the field. We are honored to host such a wide range of diverse STEM talent!

We thank the National Science Foundation (NSF) directors, who provide unwavering support of this conference through their broadening participation initiatives. The NSF, through the LSAMP program and its ongoing funding of initiatives and programming, provides needed sustenance to our institutions as they produce new leaders in the global science community. From the esteemed scientists, educators, and researchers, to the students still maneuvering toward their chosen scientific paths, I thank you for your participation. Your acceptance of our invitation serves as a warm reminder that we work in collaboration to recruit, retain, graduate, and embrace underrepresented minorities in the STEM fields.

Welcome to Chicago and our *Focus on the Future!*

Sincerely,

LeRoy Jones II, Ph.D.  
Co-Principal Investigator

CSU Address:  
Center for STEM Education & Research  
9501 South King Drive, SCI 101A  
Chicago, IL 60628

IUPUI Address:  
IU School of Education at IUPUI  
902 West New York Street, ES  
1121  
Indianapolis, IN 46202

ANL Address:  
Communications, Education and Public Affairs  
9700 South Cass Avenue, Bldg. 360  
Argonne, IL 60439

**Find us online at: <http://lsmce.org>**

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# TABLE OF CONTENTS

Conference Agenda at a Glance . . . . .	2
Professional Sessions . . . . .	3–4
Student Sessions . . . . .	5
Student Session Presenter . . . . .	5
Student Workshops . . . . .	6
Opening Keynote . . . . .	7
Lunch Keynote . . . . .	8
Voices of Success Panel . . . . .	9–10
iREU Student Experiences Panel . . . . .	11–12
Breakout Session Abstracts . . . . .	13–17
Workshops . . . . .	18
Bridge to the Doctorate Student Oral Presentations . . . . .	19–21
A Special Thank You . . . . .	22
Hotel Information . . . . .	23–24

# CONFERENCE AGENDA AT A GLANCE\*

## Friday

12:00 – 8:00 pm	Registration	Reception Area
2:00 – 4:00 pm	LSMCE Partner Meeting	Willow Room
3:00 – 5:00 pm	Networking Social	Arbor Room
5:00 – 6:00 pm	Student Headshots	Atrium
7:00 – 7:15 pm	Opening Remarks and Banquet Dinner	Arbor Room
7:15 – 8:30 pm	Opening Keynote Terrell L. Strayhorn, Ph.D. <i>Professor and Director of the Center for Higher Education Enterprise at The Ohio State University</i>	Arbor Room
9:00 – 10:00 pm	Poster Session 1	Pavilion
10:00 – 11:00 pm	Poster Session 2	Pavilion

## Saturday

7:00 am – 12:00 pm	Registration	Reception Area
7:30 – 8:30 am	Breakfast	Arbor Room
8:00 – 9:10 am	Morning Session – <i>iREU Student Experiences Panel</i> Panelists: Alfred Conklin, Randy Duran, Christina Goode, Nick Means, Maya Navarro, Calvin Powell	Arbor Room
9:15 – 10:15 am	Breakout Session 1	Breakout Rooms
10:20 – 11:20 am	Breakout Session 2	
11:25 am – 12:25 pm	Breakout Session 3	
11:25 am – 12:25 pm	Student Resource Fair	
12:45 – 1:15 pm	NSF Luncheon Keynote Sylvia James, Ph.D. <i>LSAMP Meeting the Challenge of Innovative Science</i>	Arbor Room
1:15 – 2:15 pm	Afternoon Session – <i>Voices of Success Panel</i> Moderator: Pamella Shaw Panelists: Quenton Bonds, Cara Cowan Watts, Martha Gay, Lauren Simkins, Geovannie Ojeda-Torres, Shalina Taylor	Arbor Room
2:30 – 3:40 pm	Workshops	Breakout Rooms
3:45 – 4:00 pm	Student Poster Awards	Arbor Room
4:00 pm	Closing Remarks	Arbor Room

\*All times are Central Daylight Time (CDT).

# PROFESSIONAL SESSIONS

## Breakout and Workshop Sessions for Administrators, Faculty, and Staff

Session 1 9:15 am	 <i>"My Car Broke Down" and Other Reasons I Couldn't Stay on Task: Best Practices for Commuter STEM Student Retention and Success</i> <b>Ben Flores:</b> University of Texas at El Paso and UT System LSAMP	Forest Room
	 <i>Undergraduate Research Programs in a Four-year Institution Setting</i> MODERATOR <b>Brenda Morales:</b> Oklahoma State University PANELISTS <b>Arianna Arciero-Pino:</b> University of Texas El Paso and UT Systems LSAMP <b>Prajukti Bhattacharyya:</b> University of Wisconsin–Whitewater and WISC-LSAMP <b>U. Sunday Tim:</b> Iowa State University and IINSPIRE LSAMP	Savannah Room
	 <i>CSU-LSAMP: Strategies for Maintaining a Cohesive Alliance and Maximizing Successful Outcomes</i> <b>Lisa Hammersley:</b> Sacramento State University and CSU-LSAMP <b>Nicole Campos:</b> California State University and CSU-LSAMP	Woodland Room
	 <i>LSMCE Broadening Participation Digital Library Launch: Dissemination off 25 Years of Game-Changing Work by the Alliances</i> <b>Rebecca Pitkow:</b> Guardians of Honor	White Oak Room
Session 2 10:20 am	 <i>Leveraging External Funding for California State University LSAMP International Research Programs</i> <b>John Banks:</b> California State University, Fullerton and CSU-LSAMP <b>Christina Goode:</b> California State University, Fullerton and CSU-LSAMP	Forest Room
	 <i>NSF LSAMP Bridge to the Doctorate: Facilitating Graduate Academic Success</i> <b>Denise Yates:</b> University of Illinois at Chicago and IL-LSAMP <b>Ari Arciero-Pino:</b> University of Texas El Paso and UT Systems LSAMP <b>Joan Blanton:</b> Jackson State University and LSMAMP	White Oak Room
	 <i>Collaborative Efforts for Student Transition in Mathematical Sciences</i> <b>Tuncay Aktosun:</b> University of Texas at Arlington and UT Systems LSAMP	Woodland Room
	 <i>New Program Development: Best Practices and Lessons Learned</i> MODERATOR <b>Anthony Quinn:</b> University of Toledo and LSMCE PANELISTS <b>Linda Brazdil:</b> Loyola University Chicago and LSMCE <b>Kazi Javed:</b> Kentucky State University and KY-WV LSAMP <b>Scott Molitor:</b> University of Toledo and LSMCE <b>Donna Stallings:</b> Lincoln University and LSMCE <b>Sheela Vemu:</b> Waubonsee Community College and LSMCE	Savannah Room

### Themes

Engaging Learners with Innovative Teaching

Leveraging External Resources

### Session 3

11:25 am

**LSAMP Program Management and Coordination: Best Practices and Open Discussion** White Oak Room  
MODERATOR **Kay Porter**: Oklahoma State University and OK-LSAMP  
PRESENTERS  
**Dani Mitchell**: Iowa State University and IINSPIRE  
**Mary Darrow**: Iowa State University and IINSPIRE

**Undergraduate Research Programs in a Community College Setting** Savannah Room  
MODERATOR **Kim Nguyen**: LSMCE  
PANELISTS  
**Eda Davis-Lowe**: Valencia College and Central Florida LSAMP  
**Dmitry Kalantarov**: Essex County College and Garden State LSAMP  
**Nadia Lvov**: Essex County College and Garden State LSAMP  
**Tica Valdes**: Onondaga Community College and Upstate LSAMP

**Peer Mentoring in STEM: Training for Mentors** Woodland Room  
**Barbara A. Fink**: The Ohio State University and OH-LSAMP  
**Kaitlyn Murray**: The Ohio State University and OH-LSAMP

**Bridge to the Doctorate Student Oral Presentations** Forest Room

*Autophagic Flux Measurements in U87 and U251  $\Delta$ LC3B-eGFP-mCherry Brain Cancer Cells*  
**Van Bui**

*Analysis of the Authenticity of a Confiscated Metal Art Object*  
**Krystal Cunningham**

*AK4 Expression-dependent mTOR Activation and Biological Effects on Cell Proliferation*  
**Candice Larson**

*Visible-Light-Induced Olefin Activation using 3D Aromatic Boron-Rich Cluster Photo-oxidants*  
**Marco Mencía**

*Effect of SUMOylation and Groucho Interaction on Transcriptional Repression by the T-box Transcription Factor TBX-2*  
**Bethanie-Michelle Statler**

### Workshops

2:30 pm

**Supporting Students in STEM through the Learning Assistant (LA) Model** Forest Room  
**Laurie Langdon**: University of Colorado at Boulder and Colorado LSAMP  
**Mel Sabella**: Chicago State University and IL-LSAMP

**Proven Best Practices for a STEM Transition Pathway from Community College to Four-year Program** Savannah Room  
**Alexander Gates**: Rutgers University and Garden State LSAMP

Programmatic Successes

Supporting Student Transition

# STUDENT SESSIONS

## Breakout and Workshop Sessions for Students

9:15 – 11:25 am	<i>R.E.A.D.I.T. Theory to Success</i> <b>Brian Thomas:</b> KIPNspire Group	Arbor Room
11:30 am – 12:30 pm	Resource Fair	Reception Area
Workshop Session 1 2:15 – 2:45 pm	<i>Applying for the NSF GRFP</i> <b>Emily Easton:</b> University of Chicago	White Oak Room
	<i>Secrets to Getting the Undergraduate Internship</i> <b>Meridith Bruozas:</b> Argonne National Laboratory <b>Robert Schuch:</b> Argonne National Laboratory	Woodland Room
Workshop Session 2 2:45 – 3:15 pm	<i>Grad School: How to Get There, How to Stay There, and How to Graduate with the Ph.D.</i> <b>Denise Yates:</b> University of Illinois at Chicago	White Oak Room
	<i>Navigating Salary Negotiations</i> <b>Martin Scheeler:</b> University of Chicago	Woodland Room

# STUDENT SESSION PRESENTER

## Beyond the GPA: The “Read It” Theory to Success

**Brian Thomas**, *Founder, KIPNspire Group*

In a world of fitting in and constant connectivity, there is a simple theory that can assist you on your path to success and separate you from the norm. Brian Thomas, founder of KIPNspire, presents the “Read It” Theory to Success. Among the dirt roads, highways, and waterways to success, you will face many challenges. This theory provides the lay of the land. It’s up to you to navigate accordingly.

A career in corporate America, private industry, or government comes with the development, use, and mastery of a unique set of skills. We are a skills-based world, and those who master their skill sets achieve greatness beyond measure. The “The Read It” Theory to Success will provide insight into how skills are classified, utilized, and maximized.

This workshop is presented by a STEM graduate with 10 years of industry experience, who has spoken to many universities, government-funded programs, K-12 schools, and non-profit organizations across the nation. His combination of experience from the corporate sector and information-transfer capabilities as a professional development educator, motivator, and strategy teacher allows him to share real-world knowledge with those who desire to succeed. Join KIPNspire and LSMCE to be educated and motivated to cross the finish line by taking the path of GREATNESS.

**Résumé:** This is a non-verbal definition of who you are professionally.

**Experience:** What have you done that excites, and how has it prepared you?

**Attitude:** Your attitude will determine your altitude.

**Determination:** To win, you must persevere and believe that you will not fail.

**Intelligence:** socially, emotionally, and technically.

**Timing:** You don’t know when your name will be called; are you prepared?



# STUDENT WORKSHOPS

## Applying for the National Science Foundation Graduate Research Fellowship

**Emily W. Easton**, *Associate Dean of Students at University of Chicago*

The National Science Foundation Graduate Research Fellowship (NSF GRFP) is a highly prestigious award that has the potential to alter the course of any science career. In 2015-2016, the award included a \$34,000 stipend, along with a \$12,000 cost of education allowance for tuition and fees, opportunities for international research and professional development, and the freedom to conduct research at any accredited U.S. institution of graduate education. NSF reviewers evaluate applicants both on the intellectual merit and the broader impacts of their research.

This session will explain the components of the application, how students can prepare to apply, and how to approach both of the required essays: the personal, relevant background, and future goals statement and the research statement. This presentation has been built from advice from former and current NSF GRFP faculty review panels and the University of Chicago Writing Program, as well as an analysis of successful applications from student winners. Anyone interested in applying for a NSF GRFP or supporting applicants for this award should plan to attend.

## Secrets to Getting the Undergraduate Internship

**Meridith Bruozas**, *Manager, Educational Programs and Outreach at Argonne National Laboratory*  
**Robert Schuch**, *Website and Social Media Assistant, Communications, Education, and Public Affairs at Argonne National Laboratory*

An undergraduate internship can have a tremendous impact on a student's academic career. Among the benefits is networking opportunities, mentorships, new technical skills, and college credit. In this session, we will discuss different types of internships, how and where to find them, strategies for applying, and what makes an ideal intern.

## Navigating Negotiations

**Emily W. Easton**, *Associate Dean of Students at University of Chicago*  
**Martin Scheeler**, *Doctoral Student at University of Chicago*

While most people spend time perfecting their cover letters, résumés, and interview strategies, most people fail to prepare for salary negotiations when the job offer comes—and some people don't negotiate at all! On average, people who negotiate earn an average of \$600,000 more over their entire careers than their colleagues who do not.

This session will cover the basics of negotiations including how to prepare, how to approach the conversation, and how to determine what will be most valuable to you as a professional, no matter what field you are in. It also will include additional information on how to approach academic and non-academic negotiations, with a focus on scientific careers. The presentation will offer some discussion on salary negotiations specifically, but also the myriad of other benefits to negotiate during the job offer process. This session will be useful for anyone who wants to approach this part of the professional process with more confidence, especially people earlier in their careers (e.g. students).

## Grad School: How to Get There, How to Stay There, and How to Graduate with the Ph.D.

**Denise Y. Yates, MA, NCC**, *Director for Programs & Site Coordinator and Director NSF LSAMP Bridge to the Doctorate at the University of Illinois at Chicago*

The objective of this session is to offer insight on graduate school preparation, application, and admissions processes. The session will provide opportunity for participants to ask questions about embarking upon the next leg of their educational journeys, and it will provide the timeline for all graduate school processes.

# OPENING KEYNOTE



## **Terrell L. Strayhorn, Ph.D .**

*Professor and Director of the Center for Higher Education Enterprise at The Ohio State University*

Terrell L. Strayhorn is Professor and Director of the Center for Higher Education Enterprise at The Ohio State University. A renowned student success scholar, highly acclaimed public speaker, and thought leader, Dr. Strayhorn is author of 10 books, including *College Students' Sense of Belonging*; more than 50 book chapters; and more than 200 journal articles and other scholarly publications. He has presented over 300 keynotes and invited lectures across the globe, including a TEDtalk in 2011. He has been quoted in *Huffington Post*, *Business First*, *Chronicle of Higher Education*, *Ebony*, and others, generating more than 5,000 citations worldwide. Dr. Strayhorn is a member of Alpha Phi Alpha Fraternity, and he is known for using the hashtag #DoGoodWork on social media. He was named one of the country's top diversity scholars by *Diverse: Issues* and in 2014 became the youngest full professor in Ohio State's history.

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A photograph of a modern university building with a large glass facade. The building has a prominent glass entrance and is surrounded by people walking on a paved area. The sky is blue with some clouds.

# LUNCH KEYNOTE



## **Sylvia M. James, Ph.D.**

*Director of the Division of Human Resource Development at the National Science Foundation Directorate for Education and Human Resources*

Sylvia M. James is Director of the National Science Foundation (NSF) Division of Human Resource Development (HRD) in the agency's Directorate for Education and Human Resources. She oversees a \$148 million budget and a talented team of scientific and administrative staff. Dr. James has primary responsibility for implementing NSF's new INCLUDES program, an agency-wide activity in broadening participation.

During her 15-year tenure at NSF, Dr. James has served in a number of senior leadership positions for the divisions of Research on Learning in Formal and Informal Settings and Human Resource Development. She has managed program portfolios in informal science education, innovative technology experiences for students and teachers, advanced technological education, innovation through institutional integration, and after-school programs in exploration and discovery.

Dr. James currently serves as the Co-Chair of the National Science and Technology Council's Federal Coordination in STEM (FC-STEM) Broadening Participation Interagency Working Group and as the NSF Liaison to the President's Board of Advisors (PBA) on HBCUs. She also has been a member of the Burroughs Wellcome Fund, Student Science Enrichment Program (SSEP) Advisory Committee since 2012. She is also a member of the interagency working group for the White House Initiative on Educational Excellence for Hispanics (WHIEEH).

Prior to NSF, Dr. James was the Director of Education at the National Aquarium in Baltimore, where she was employed for 14 years. While at the National Aquarium, she directed teacher training and youth enrichment projects supported by several national funders. She has served as an education consultant for science education radio, youth publications, and museums and as an adjunct science faculty member at Sojourner-Douglass College in Baltimore.

Dr. James is the author of seven children's books on marine animals, in addition to science education publications and reports. She holds a Bachelor of Science degree in biology from Loyola University, a Master of Science degree from the Johns Hopkins University, and a doctorate in science education from Morgan State University.

# VOICES OF SUCCESS PANEL



**Moderator: Pamella P. Shaw, D.M.D., M.P.H.**

*Associate Dean for Diversity, Equity, and Inclusion at Indiana University School of Dentistry*

Pamella P. Shaw is the Associate Dean for Diversity, Equity, and Inclusion at Indiana University School of Dentistry, and she is a member of the administrative team of the Louis Stokes Midwest Center of Excellence (LSMCE) at Indiana University-Purdue University Indianapolis (IUPUI). Her role will help transition students through their baccalaureate programs and prepare them for graduate education and careers in STEM.



**Quenton Bonds, Ph.D.**

*Entrepreneur, Educator, Engineer at NASA, and the Founder of Accelerated Destiny*

Quenton Bonds is a research electronics engineer in the Microwave Instruments and Technology Branch of the National Aeronautics and Space Administration (NASA) at the Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. As the Lead Radiometer Systems Engineer on the WISM Project, Dr. Bonds characterizes his research focus within the design and development of microwave instrumentation for geoscience and space, as well as other remote sensing applications. He received a B.S. in mathematics from Alabama State University in 2001 and an M.S. in electrical engineering in 2006 from the University of South Florida, where he also received his Ph.D. in 2010.



**Martha Gay, Ph.D.**

*Adjunct Professor at Bowie State University*

Martha Gay received her B.S. in biology from Hampton University (2004) and entered the workforce as a cytogeneticist at Sentara Norfolk General Hospital in Virginia. In fall 2008, she received an LSAMP Bridge to the Doctorate (BD) award and earned her Ph.D. in pharmacology from Howard University (2015). Her future plans include a post-doctoral fellowship program in Washington, D.C. As a non-traditional student who greatly benefited from the encouragement and mentorship she received in the BD program, Dr. Gay's goals are to inspire others with her accomplishments and to help pave the path for the next generation of scientists to transcend the ranks of a doctoral education.



**Lauren Simkins, Ph.D.**

*Postdoctoral Research Associate at Rice University*

Lauren Simkins is a Postdoctoral Research Associate in the Department of Earth Science at Rice University. She is researching past behavior of the Antarctic Ice Sheet. Dr. Simkins received her B.S. in geology and Spanish from Oklahoma State University (2009) and Ph.D. in geological sciences from the University of California Santa Barbara (2014). She is an LSAMP Scholar and Bridge to Doctorate Fellow. Her goals include empowering people of all educational, socioeconomic, and cultural backgrounds to pursue STEM fields. She also seeks to make her research accessible and relevant to local communities and society as a whole.



### **Shalina Taylor, Ph.D.**

*Cardiovascular Postdoctoral Fellow at Stanford University  
School of Medicine*

Shalina Taylor obtained a bachelor's degree in biology from Florida Agricultural and Mechanical University. She later attended University of Illinois at Chicago (UIC) College of Medicine, where she earned a Ph.D. in pharmacology. During Dr. Taylor's tenure at UIC, her research focused on the role of neutrophils during inflammation. Currently, she is a Postdoctoral Fellow in the Department of Pediatrics at Stanford University School of Medicine, and her research focuses on the functional aspects of neutrophil during Pulmonary Arterial Hypertension.



### **Geovannie Ojeda-Torres, Ph.D.**

*Chemist at the Center for Disease Control and Prevention*

Geovannie Ojeda-Torres is a chemist on the Emergency Response Branch of the Center for Disease Control and Prevention. He received his doctorate in chemistry in 2015 from the University of Illinois at Chicago, where his research focused on the development of tools for chemical sampling and analysis of neuronal tissue Ex Vivo. Dr. Ojeda-Torres also received a master's degree from UIC in chemistry in 2011. He completed his undergraduate studies in 2008 at the University of Puerto Rico, where his research was focused on the detection of fatty acid ethyl esters in skin surface lipids as biomarkers of ethanol consumption in alcoholics, social drinkers, light drinkers, and teetotalers. Dr. Ojeda-Torres was part of the faculty at Harry S. Truman College in Chicago, where he taught courses on chemistry and physical science. Outside of the lab, Dr. Ojeda-Torres enjoys working with students and promoting STEM within underrepresented communities.



### **Cara Cowan Watts, Ph.D.**

*Biosystems Engineering at Oklahoma State University and  
CEO at Tulsa Pier Drilling*

Cara Cowan Watts is the CEO and majority owner of Tulsa Pier Drilling, a commercial pier drilling company in Tulsa, Oklahoma. In addition to her work in private industry, she is active in the community and served as the elected Cherokee Nation Tribal Legislator for portions of Tulsa and Rogers counties for 12 years (2003-2015). Dr. Cowan Watts received her B.S. in mechanical engineering (1997), her M.S. in telecommunications management (2002), and her Ph.D. in biosystems engineering (2015)—all from Oklahoma State University. She is a Louis Stokes National Science Foundation Fellow and a twice-elected member of the American Indian Science and Engineering Society Board of Directors. Dr. Cowan Watts passions include educating, mentoring, and encouraging youth in science, technology, engineering, and mathematics.



# iREU STUDENT EXPERIENCES PANEL



## **Alfred Conklin Jr., Ph.D.**

*Professor of Agriculture at Wilmington College*

Alfred Conklin has been at Wilmington College in Wilmington, Ohio for 40 years. He primarily teaches soils for the Agriculture program and organic chemistry for the Chemistry department. Typically, he works each semester with three undergraduate students who conduct research on various topics. In addition, Dr. Conklin is the International Director of the International Undergraduate Research Symposium and has had three Fulbrights. He also has written 14 books, three of which were published by well-known publishing houses.



## **Randy Duran, Ph.D.**

*Materials-Cain Chair in Science, Technological, Engineering, and Mathematical Literacy at Louisiana State University*

Randy Duran is a Professor of Chemistry and supports international STEM literacy and undergraduate research efforts campus-wide through Louisiana State University's Office of Research and Economic Development. One of the international programs is the NSF US/ France/ Belgium iREU in Translational Chemistry, for which he is Principal Investigator.



## **Christina Goode, Ph.D.**

*Professor of Biochemistry at California State University, Fullerton*

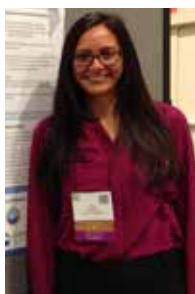
Christina Goode graduated in 1980 from the University of London with a BSc and in 1984 from the University of Guelph in Canada with a Ph.D., both in biochemistry. From 1984 to 1989, Dr. Goode was a postdoctoral associate and teaching associate at California State University, Fullerton. In 1989, she was hired into a biochemistry faculty position at CSU Fullerton. Dr. Goode has held several NIH and NSF research and training grants including MBRS, iMSD, and Bridges to the Future. Since 2007, she has directed the CSUF CSU-LSAMP program. Most recently, she was elected chair of the Western Association Advisors for Health Profession Committee for Diversity and Inclusion.



## **Nicolas Means**

*Graduate Student at University of Oklahoma*

Nicolas Means graduated from Oklahoma State University in 2015 with a bachelor's degree in microbiology and cell and molecular Biology. While attending OSU, Mr. Means had the opportunity participate in a six-month iREU program in collaboration with OSU, Louisiana State University, Joseph Fourier University, OK-LSAMP, and the NSF in Grenoble, France. His collaborative project dealt with the enzymatic versus electrocatalytic oxidation of NADH at carbon-nanotube electrodes modified with glucose dehydrogenases with an application to glucose enzymatic fuel cells. Currently, Mr. Means is a first-year graduate student at the University of Oklahoma Health Sciences Center working towards a Ph.D. in microbiology and immunology.



## **Maya Navarro**

*Chemist I at Particle Technology Labs*

Maya Navarro is a recent graduate of DePaul University with a bachelor's in chemistry. Throughout her college education, she participated in REUs at the Las Cruces Biological Station in Costa Rica, Oregon Health and Science University Institute of Environmental Health and the Harvard University Department of Physics. She recently began her position as Chemist I at Particle Technology Labs in Downers Grove, Illinois.



## **Calvin Powell**

*Physics Student at Chicago State University*

Calvin Powell is a student at Chicago State University, where completing the final semester of his B.S. in physics with an engineering option. Following graduation, he plans to enter the workforce in a technical capacity. After securing employment, he hopes to return to pursue an MBA. Mr. Powell completed his IREU this past summer at the European Center for Nuclear Research in Geneva, Switzerland, where he performed data analysis on the performance of the prototype detectors that comprise the new FIT detector to be installed in the ALICE experiment at CERN in 2018.

# BREAKOUT SESSION 1 ABSTRACTS

## ■ “My Car Broke Down” and Other Reasons I Couldn’t Stay on Task: Best Practices for Commuter STEM Student Retention and Success

**Benjamin Flores, Ph.D.**, *Professor of Engineering and UT System LSAMP Director at University of Texas at El Paso*

As the number of commuter students increases at four-year institutions, we begin to hear more reasons why our STEM students miss class, fall behind, or even stop out. If our institutions are committed to supporting this student population, we should recognize and study the particular challenges these students face and, ultimately, implement strategies to maintain student engagement. In this session, we will discuss best practices for socio-academic integration of STEM students, including, but not limited to, course clustering, peer-led team learning, supplemental instruction workshops, dedicated spaces for group study, and cooperative learning areas at the library.

## ■ Undergraduate Research Programs in a Four-year Institution Setting

■ This panel discussion will explore how student research opportunities improve the retention, graduation, and transfer rates of underrepresented minority students in four-year institution setting. Panelists will share an overview of the research programs on their campuses, and they will provide program outcomes to date. In addition, panelists will share their voice in answering questions from the moderator and audience members.

MODERATOR

**Brenda Morales**, *OK-LSAMP Program Director at Oklahoma State University and OK-LSAMP*

PANELISTS

**Ariana Arciero-Pino**, *UT System LSAMP Associate Director at University of Texas at El Paso*

**Prajukti Bhattacharyya, Ph.D.**, *Associate Professor, Department of Geography, Geology, and Environmental Science at University of Wisconsin-Whitewater*

**U. Sunday Tim, Ph.D.**, *Associate Professor, Department of Agricultural and Biosystems Engineering at Iowa State University; Faculty Leader at IINSPIRE LSAMP*

## ■ CSU-LSAMP: Strategies for Maintaining a Cohesive Alliance and Maximizing Successful Outcomes

**Lisa Hammersley, Ph.D.**, *Professor of Geology and Lead Project Director CSU-LSAMP at Sacramento State University*  
**Nicole Campos**, *Project Manager at CSU-LSAMP Statewide Office, California State University*

CSU-LSAMP is an alliance of all 23 campuses of the California State University system and serves more than 3,000 students per year through a wide series of campus-based and system-wide activities. With such a large alliance, it has been important to develop a clear structure and a set of common policies and procedures that promote consistency and accountability and ensure integrity in evaluation and reporting. An annual meeting of campus coordinators allows for exchange of ideas and updates on the progress of the alliance. CSU-LSAMP is structured to allow campuses the flexibility to provide activities that best address the needs of their students, while also maintaining strong central goals and objectives that maximize the collective impact of the alliance.

Each year, in order to receive funding, campuses must provide proposals outlining their activities, estimated numbers of participants, and a budget justification. Although campuses receive subawards, funds are administered centrally through Sacramento State to ensure consistency in scrutiny of invoices. Campuses are required to submit two annual reports to the statewide office; an interim report, which provides the basis for the annual report to NSF; and the WebAMP report. Individual WebAMP reports are checked carefully by the statewide office and our external evaluator to ensure they are complete, accurate, and self-consistent. Evaluation of CSU-LSAMP is performed annually by an external evaluator. As all alliance partners are part of the same educational system, the evaluator has direct access to the CSU Office of the Chancellor for comparison data and longitudinal studies, which allows for comprehensive evaluation of the impact of the program.



## ■ LSMCE Broadening Participation Digital Library Launch: Dissemination of 25 Years of Game-Changing Work by the Alliances

**Rebecca Pitkow, MPP**, *Director, Business Development at Guardians of Honor, LLC*

Guardians of Honor, a member of the LSMCE Leadership Team, will be launching the LSMCE Broadening Participation Digital Library (BP DL) at this year's conference. The LSMCE BP DL features hundreds of reports, briefs, flyers, and videos that document the history and success of the LSAMP program and its alliances. Please join us for a tour of the site and a collective discussion of future plans.

## BREAKOUT SESSION 2 ABSTRACTS

### ■ Leveraging External Funding for California State University-LSAMP International Research Programs

**Christina Goode, Ph.D.**, *Professor of Biochemistry at California State University at Fullerton*

**John E. Banks, Ph.D.**, *Director of Undergraduate Research Opportunities Center at California State at Monterey Bay*

The California State University (CSU) LSAMP is a comprehensive program aimed at preparing participants for STEM careers and includes involvement in international research as one of its objectives. In addition to supporting iREUs, study abroad, and travel with research advisors, CSU-LSAMP also directly funds two international experiences which are open to CSU-LSAMP participants from any of the Alliance campuses and are examples of the power of leveraging funding using the external sources of NSF and the Chancellor's Office together with campus-based funding sources.

The CSU-LSAMP program in Thailand is led by CSU Fullerton (CSUF) and emphasizes applied research and intercultural competence. CSU-LSAMP students spend a summer working on projects with Thai faculty at Chiang Mai University. CSU-LSAMP funding covers travel expenses and a per-diem for the CSU-LSAMP students. The program is co-offered with a Special Topics in Research program open to CSU Fullerton upper-classmen who pay a course fee. Some of the costs to deliver the program in Chiang Mai, such as local transportation and bench fees, are shared between CSUF and CSU-LSAMP.

The CSU-LSAMP program in Costa Rica is led by CSU Monterey Bay (CSUMB) and takes place in a variety of settings including the Monteverde cloud forest and the rainforest near La Cangreja National Park. Participants are immersed in the rigorous study of tropical environments, biological diversity and current issues in agroecology. Participants receive Environmental Studies credit, and the program is open to students from all CSU campuses. CSU-LSAMP funding covers travel expenses and tuition so that financial barriers are removed; further funding from other federal and state sources are available to students at CSUMB to support their involvement in the program. These programs have both proven successful as measured by the high percentage of participants who engage in additional iREUs or transition to graduate programs

### Themes

Engaging Learners with Innovative Teaching

Leveraging External Resources

Programmatic Successes

Supporting Student Transition

# BREAKOUT SESSION 2 ABSTRACTS

## ■ NSF LSAMP BD: Facilitating Graduate Academic Success

**Denise Y. Yates, MA, NCC**, *Director for Programs & Site Coordinator and Director of NSF LSAMP Bridge to the Doctorate at University of Illinois at Chicago*

The University of Illinois at Chicago (UIC) has a strong track record for and commitment to graduate training of underrepresented minorities (URM) in STEM fields. From 2001 to 2006, 11 URM STEM PhDs were awarded at UIC. From 2011 to 2016, the number of completed PhDs increased to 26. This marked increase has been, in large part, due to the NSF ILSAMP Bridge to the Doctorate at UIC. The objective of the session is to interactively share successful programming methods to offer a springboard for action at the attendees' home institutions.

## ■ Collaborative Efforts for Student Transition in the Mathematical Sciences

**Tuncay Aktosun, Ph.D.**, *Professor of Mathematics at University of Texas at Arlington*

The efforts to attract, retain, mentor, and graduate underrepresented minorities in the mathematics programs at the University of Texas at Arlington are outlined. Our strategy certainly includes efforts to ensure student success in classes, but equally important, it also includes efforts to transition undergraduate and graduate students into professions and (some undergraduate students) into graduate studies. Such efforts not only include our own departmental efforts using resources related to faculty and undergraduate and graduate students, but also collaborations with colleagues in the region and in the nation, especially with colleagues who are dedicated mentors of underrepresented minorities and students from underserved institutions. The presentation describes various efforts, such as securing external funding for our activities and student support, mentoring at all levels, outreach activities to establish collaborations with local organizations and local industries, empowering students by helping them to assume leadership roles, establishing peer mentoring among students, maintaining ties with former graduates, and collaborations with colleagues in other universities where similar efforts and activities take place.

## ■ New Program Development: Best Practices and Lessons Learned

This session explores the best practices in developing new programs on your campus through the voice of our panelists, who have been key personnel in conceptualizing and implementing a new program on their campuses. The panel discussion will include indicators of administration and institutional readiness, how to building collaborations inter- and intra-campus, how to perpetuate engagement and buy-in among the STEM faculty, plus other considerations and potential challenges. The session will end with an open Q&A session from the audience.

MODERATOR

**Anthony Quinn, Ph.D.**, *Assistant Dean and Associate Professor of Biological Sciences at University of Toledo*

PANELISTS

**Linda Brazdil, Ph.D.**, *Director of the Center for Science and Math Education and Senior Lecturer in the Department of Chemistry and Biochemistry at Loyola University Chicago*

**Kazi Javed, Ph.D.**, *Associate Professor of Chemistry at Kentucky State University*

**Scott Molitor, Ph.D.**, *Associate Professor and Interim Associate Dean for Undergraduate Studies at University of Toledo*

**Donna Stallings, Ph.D.(c)**, *Instructor, Computer Science, Technology & Mathematics at Lincoln University*

**Sheela Vemu, Ph.D.**, *Instructor, Biology at Waubensee Community College*

# BREAKOUT SESSION 3 ABSTRACTS

## ■ LSAMP Program Management and Coordination: Best Practices and Open Discussion

The purpose of the session is to provide LSAMP alliance program directors, managers, and coordinators an opportunity to share best practices in managing an alliance or site. Program leaders from IINSPIRE will present an overview of the tools and practices their alliance uses for post-graduation student tracking, student and site data collection, budget management, site management, and reporting. For each topic above, we welcome open discussion among the audience members to share their tools or lessons learned.

### MODERATOR

**Kay Porter**, *Former Program Manager at Oklahoma Louis Stokes Alliance for Minority Participation*

### PRESENTERS

**Mary Darrow, Ph.D.**, *Assistant Director and Evaluation Coordinator of the IINspire-LSAMP Program and the Assistant Director of External Relations with the Office of Community College Research and Policy at Iowa State University*

**Danielle Mitchell**, *IINSPIRE LSAMP Alliance Program Manager at Iowa State University*

## ■ Undergraduate Research Programs in a Community College Setting

■ This panel discussion will explore innovations to create and sustain student research opportunities that improve the retention, graduation, and transfer rates of underrepresented minority students in a community college setting. Panelists will share an overview of the research program development on their campus, and provide the program outcomes to date. In addition, panelists will share their voice in answering questions from the moderator and audience members.

### MODERATOR

**Kim Nguyen, Ed.D.**, *LSMCE Co-Principal Investigator; Director for Statewide and Regional Collaborations STEM Education Innovation and Research Institute at Indiana University-Purdue University Indianapolis*

### PANELISTS

**Eda Davis-Lowe**, *Director, LSAMP B2B Project at Valencia College; Central Florida LSAMP*

**Dmitry Kalantarov, Ph.D.**, *LSAMP Summer Research Coordinator at Essex County College; Garden State LSAMP*

**Nadia Lvov**, *ECC LSAMP Project Director, Division of Mathematics and Physics at Essex County College; Garden State LSAMP*

**Vicentica Valdes**, *LSAMP Coordinator and Physics Instructor at Onondaga Community College; Upstate LSAMP*

# BREAKOUT SESSION 3 ABSTRACTS

## ■ Peer Mentoring in STEM: Training for Mentors

**Barbara A. Fink, O.D., Ph.D.**, *Alliance Director at Ohio LSAMP Alliance; Faculty Fellow, Office of Diversity and Inclusion and Professor, College of Optometry at The Ohio State University*

**Kaitlyn Murray, B.S.**, *College of Food, Agricultural, and Environmental Sciences at The Ohio State University*

Peer mentoring is a key component of LSAMP programming throughout LSAMP alliances nationwide. Studies have demonstrated its effectiveness in student retention and persistence in STEM. Peer mentoring can be particularly beneficial for underrepresented minority students at predominantly white institutions, especially underclassmen benefiting from the experience of the peer mentors, who serve as role models and friends. Peer mentoring programs also positively influence community college students' academic and transfer success and their adjustment to college.

A crucial goal of the alliance-wide peer mentoring program of The Ohio LSAMP Alliance is enhancement of collaborations with community college partners in order to build community college pathways to STEM degrees. This course provides an overview of the importance of peer mentoring in LSAMP, the development of a peer mentor training program at The Ohio State University, and the production of a massive open online course (MOOC) for the purpose of training LSAMP Scholars to be peer mentors. We will demonstrate the components of the MOOC, discuss the scholarship that underlies its creation, and provide practical guidance for enrolling students in the MOOC.

# WORKSHOPS

## ■ Proven Best Practices for a STEM Transition Pathway from Community College to a Four-year Program

**Alexander E. Gates, Ph.D.**, *Distinguished Service Professor, Department of Earth and Environmental Sciences at Rutgers University; Principal Investigator at Garden State LSAMP*

Based upon success with interactive LSAMP, B2B alliances, and an REU site, among the most effective activities to encourage URM community college students in STEM to transition into four-year programs are research experiences, cross-campus mentoring, and information sessions/seminars by faculty and staff. These interactions increased the transfer rate by up to 50% and URM STEM graduates by up to 90% at participating community colleges in one year. The activities must be tailored to be effective.

Community college students have little to no exposure to academic research. Targeted placement and an orientation session, as well as an introduction to research, a lab safety course, scientific literature, and clearly placing the activities into broader context, are very effective to bridge the experience gap. Mentoring of community college students by four-year students is especially effective if the four-year student previously attended a community college. Guidance by community college staff and invited seminars on both research and potential programs in which to transfer is also very effective. Many community college students are not aware of the programs and careers available to them. In addition to developing a campus and regional learning community, these have proven to be the most effective strategies.

This workshop will review the project and present the methods used in each best practice, and it will provide sample forms and releases for adaptation and use. The audience will be engaged primarily through reviewing the three best practices and the forms used to help implement them. They will also be asked to share any experiences they have had with these or any other best practices to encourage transition from two-year to four-year programs. Finally, there will be a period during which individuals can ask specific questions for discussion by the convener and group to help with implementation at their institutions. This may help others formulate their own implementations.

## ■ Supporting Students in STEM through the Learning Assistant (LA) Model

**Felicia Davenport**, *Student at Chicago State University*

**Laurie Langdon, Ph.D.**, *Co-Director and Research Associate, Learning Assistance Program at University of Colorado Boulder*

**Muriel McClendon**, *Student at Chicago State University*

**Mel Sabella, Ph.D.**, *Professor of Physics at Chicago State University*

**Andrea Van Duzor, Ed.D.**, *Associate Professor of Chemistry at Chicago State University*

The Learning Assistant (LA) Model is part of an international alliance that supports students in STEM classes by engaging undergraduate majors (LAs) as partners in improving instructional environments. LAs participate in weekly preparation sessions and a pedagogy course, and they act as facilitators of learning in the classroom. While all LA programs are characterized by these essential elements, individual LA programs are tailored to leverage specific institutional needs and resources.

In this session, we present a brief overview of the international LA Alliance as well as highlight specific elements of the LA Model. Workshop participants will engage in mini activities focusing on how LAs are used in the classroom, discover tools for starting and sustaining LA Programs, and explore how LAs can be partners in improving courses and promoting active engagement in the classroom.

See <http://learningassistantalliance.org> and <http://msscsu.wix.com/csu-la-program> for more information. This work is funded by the National Science Foundation (DUE # 1524829), the Department of Education, the Center for STEM Education and Research, and Chicago State University.

# BRIDGE TO THE DOCTORATE STUDENT ORAL PRESENTATIONS

## ■ Autophagic Flux Measurements in U87 and U251 $\Delta$ LC3B-eGFP-mCherry Brain Cancer Cells

**Van Bui:** Northern Illinois University

Glioblastoma (GBM) are tumors that arise from astrocytes of the brain. This is a brain cancer that is highly malignant with a poor prognosis. Treatments consist of surgery, chemotherapy, and radiation. However, the average survival time is only 15 months. Further understanding and novel treatments are urgently needed. Cell metabolism is a promising therapeutic target. In particular, autophagy is a key process in cell survival or death. Molecular cloning techniques were used to construct U87 and U251 cell lines that stably express a tandem autophagy marker protein, LC3B attached to mCherry and eGFP. During late stages of autophagy, low pH quench the green fluorescence, but the red fluorescence remains. To look into the different stages of autophagy, we treated the cell lines with 30 or 60  $\mu$ M chloroquine. This prohibits the late stages of autophagy. U251 cells do not exhibit green fluorescent puncta and with chloroquine treatment; they form vacuoles and die. U87 cells have both green and red puncta, indicating a typical pattern of autophagic flux. U87 cells do not form vacuoles upon chloroquine treatment, but they also die. There are currently seven on-going clinical trials using chloroquine, but the mechanism for how the cells die is still relatively unknown. Using p62 as another marker; we compared autophagic flux between untreated and irradiated engineered GBM cells. Comparisons of fluorescence patterns in a number of engineered GBM cells will likely lead to illumination of autophagic flux and mechanisms of cell death, which may eventually lead to new treatment options.

Funding Acknowledgement: DOD grant #W81XWH-10-1-0170; Vietnam Education Foundation

## ■ Analysis of the Authenticity of a Confiscated Metal Art Object

**Krystal Cunningham:** University of California, Los Angeles

In this communication, preliminary results of our investigations in collaboration with special agents from the Department of Homeland Security (DHS) on the analysis of a metal sculpture of a male, suspected to be looted or forged artwork. This research presents data from the contributions of X-ray fluorescence (XRF) spectroscopy, X-ray diffraction (XRD), and Scanning Electron Microscopy–Energy Dispersive Spectroscopy (SEM–EDS) for trace evidence characterization of materials in the context of a forensic investigation in art and archaeology. Results suggested that the bulk was made of native copper (Cu) sheets, affected by corrosion denoted by the presence of three of the most common copper corrosion phases: cuprite (copper oxide  $\text{Cu}_2\text{O}$ ), malachite (basic copper carbonate  $\text{Cu}_2\text{CO}_3(\text{OH})_2$ ), and atacamite (copper chloride hydroxide  $\text{CuCl}(\text{OH})_3$ ), the latter being characteristic of the “bronze disease.” Bronze disease refers to the irreversible corrosion process that occurs when chlorides come into contact with copper or copper metal alloys. Other materials identified included surface deposits of calcite ( $\text{CaCO}_3$ ) and gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ), which could be associated with burial environments and weathering or deliberate additions to fake the authentication of the sculpture. The absence of elements such as arsenic (As) and tin (Sn), main components in bronzes, and the identification of copper sheets as the bulk material suggests that the object is not a cast bronze sculpture, typical of ancient production. However, the object shows small windows (holes in the spruing system) implying a lost-wax bronze casting method. These may have been forged to imitate a bronze casting technology. Despite this evidence, further investigations using the SEM–EDS has been conducted to confirm that these data are representative of the entire object and that the copper sheets are not modern repairs. This research, at the interface of materials science and archaeology, provides a cross-disciplinary effort to better study physical evidence and changes it has undergone due to its age and environment and to aid law enforcement practitioners in combatting crime of archaeological looting and forgery of ancient materials.

Funding Acknowledgement: Eugene Cota–Robles Scholarship; Bridges to Doctorate Fellowship by the National Science Foundation

## ■ AK4 Expression-dependent mTOR Activation and Biological Effects on Cell Proliferation

**Candice Larson:** California State, Los Angeles

Cell growth is regulated, to ensure optimal host viability, through signal transduction. Deregulation of cell growth develops when genes become mutated or otherwise altered into aberrantly activated versions of specific genes. Components of signal transduction pathways become activated or halted through changes in protein composition, and this may result in unregulated induced signal cascades, which leads to abnormal cell proliferation. For cells to proliferate, they require protein and lipid synthesis, lysosome biogenesis, and energy from metabolism to make essential components for developing new cells. The mTORC1 pathway, when turned on, can produce these required building blocks. Each of these biological effects is critical components of cancer cells’ ability to continually proliferate, and therefore, abnormally active mTORC1 signaling may promote cancer. The mitochondria are also required for cell growth and proliferation due to shared energetic requirements. Recent evidence suggests that suppressing a mitochondrial protein known as adenylate kinase 4 upregulates the mTORC1 pathway, resulting in increasing the cell-cycle progression, which demonstrates that components of the mitochondria may be a platform for amplification of cell-cycle progression. To further characterize the effects of the AK4, protein in the mitochondria, on the mTORC1 pathway, the AK4 function will be suppressed, and the activation of downstream mTORC1 signaling proteins (S6Kinase and S6) and mTORC1-responsive cell cycle regulators (cyclin D1) will be assessed. I expect to find evidence to suggest that AK4 is a natural inhibitor of mTORC1 signal transduction pathway because inactive AK4, due to mutations, has been identified in some cancers. Understanding how a mitochondrial protein, AK4, interacts with cell signaling and how it associates with cell proliferation will further explain how a mitochondrial protein effects cell signaling outside the mitochondria.

Funding Acknowledgement: NSF Grant #HRD-143889



# BRIDGE TO THE DOCTORATE STUDENT ORAL PRESENTATIONS

## Visible-Light-Induced Olefin Activation using 3D Aromatic Boron-Rich Cluster Photo-oxidants

**Marco Messina:** University of California, Los Angeles

We report a discovery that perfunctionalized icosahedral dodecaborate clusters of the type  $B_{12}(OCH_2Ar)_{12}$  ( $Ar = Ph$  or  $C_6F_5$ ) can undergo photoexcitation with visible light, leading to a new class of metal-free photo-oxidants. Excitation in these species occurs as a result of the charge transfer between low-lying orbitals located on the benzyl substituents and an unoccupied orbital delocalized throughout the boron cluster core. We show how these species, photo-excited with a benchtop blue LED source, can exhibit excited-state reduction potentials as high as 3 Volts and can participate in electron-transfer processes with a broad range of styrene monomers, initiating their polymerization. Initiation is observed in cases of both electron-rich and electron-deficient styrene monomers at cluster loadings as low as 0.005 mol% to afford polymers with molecular weight ( $M_n$ ) values of 8 to 250 kDa and dispersities (?) of 1.7 to 5.8. Furthermore, photo-excitation of  $B_{12}(OCH_2C_6F_5)_{12}$  in the presence of a less activated olefin such as isobutylene results in the first reported metal-free visible-light-induced production of highly branched poly(isobutylene). This work introduces a new class of air-stable metal-free photo-redox reagents capable of mediating chemical transformations. Our system offers lower catalyst loading over previously developed systems, improved monomer scope, ease of photo-catalyst preparation, and ease of polymer purification as the photoinitiator is readily soluble in most organic solvents. Current efforts are aimed at optimizing conditions for polymerization to target block-copolymer architectures and understanding precise mechanism governing this unprecedented reactivity.

Funding Acknowledgement: NSF Bridge-to-Doctorate; NSF Predoctoral (GRFP) Fellowship; UCLA Department of Chemistry and Biochemistry; 3M for a Non-Tenured Faculty Award; NIH (DK019037); Arnold and Mabel Beckman Foundation; NSF CAREER Award CHE-1351968; CSST Scholarship; NSF (CHE-1507735); UCLA for a Dissertation Year Fellowship

## Effect of SUMOylation and Groucho Interaction on Transcriptional Repression by the T-box Transcription Factor TBX-2

**Bethanie-Michelle Statler:** University of Illinois at Chicago

T-box transcription factors play a key role in the development of many multicellular organisms. However, misregulation of T-box factors TBX2 and TBX3 in humans can cause congenital diseases and a variety of cancers. We are studying the closely related *C. elegans* ortholog of these factors TBX-2 to understand the molecular mechanism by which these conserved factors function. Our genetic results show that *C. elegans* TBX-2 is a transcriptional repressor whose activity depends on post-translational modification with the SUMO peptide and interaction with the Groucho family co-repressor UNC-37. Previous data also shows that TBX-2 represses its own promoter in a negative feedback loop. We can use a *Ptbx-2::mCherry* reporter as a molecular readout to analyze the expression of TBX-2 in TBX-2 mutants defective in SUMOylation or UNC-37 interaction. Transgenically expressed wild-type TBX-2 effectively represses *Ptbx2::mCherry* so that it is only expressed in head neurons. In contrast, a conservative mutation of a key lysine residue that is conjugated to SUMO to engineer mutant TBX-2K400R reduces its repressor activity. In the mutant strain, *Ptbx-2::mCherry* is ectopically expressed in the hypodermic seam cells and posterior gut, which supports our hypothesis that TBX-2 repressor activity depends on SUMOylation. We are currently generating similar strains expressing a mutant form of TBX-2 that blocks interaction with Groucho-like protein UNC-37 and will ask if these mutations also affect TBX-2 repressor activity. We expect that TBX-2 in this mutant strain will similarly be ectopically expressed in the seam cells and posterior gut. Our results will help elucidate the molecular mechanism for TBX-2 repressor activity in *C. elegans*. If our project is successful, we can then translate this research into mammalian cell culture assays. As SUMO-conjugation sites and Groucho co-repressor interaction sites are conserved in human TBX2 and TBX3, we expect these results will help guide possible therapies for diseases involving these factors.

Funding Acknowledgement: National Science Foundation Bridge to the Doctorate Fellowship



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[ismceconference.org/2016Program](http://ismceconference.org/2016Program)

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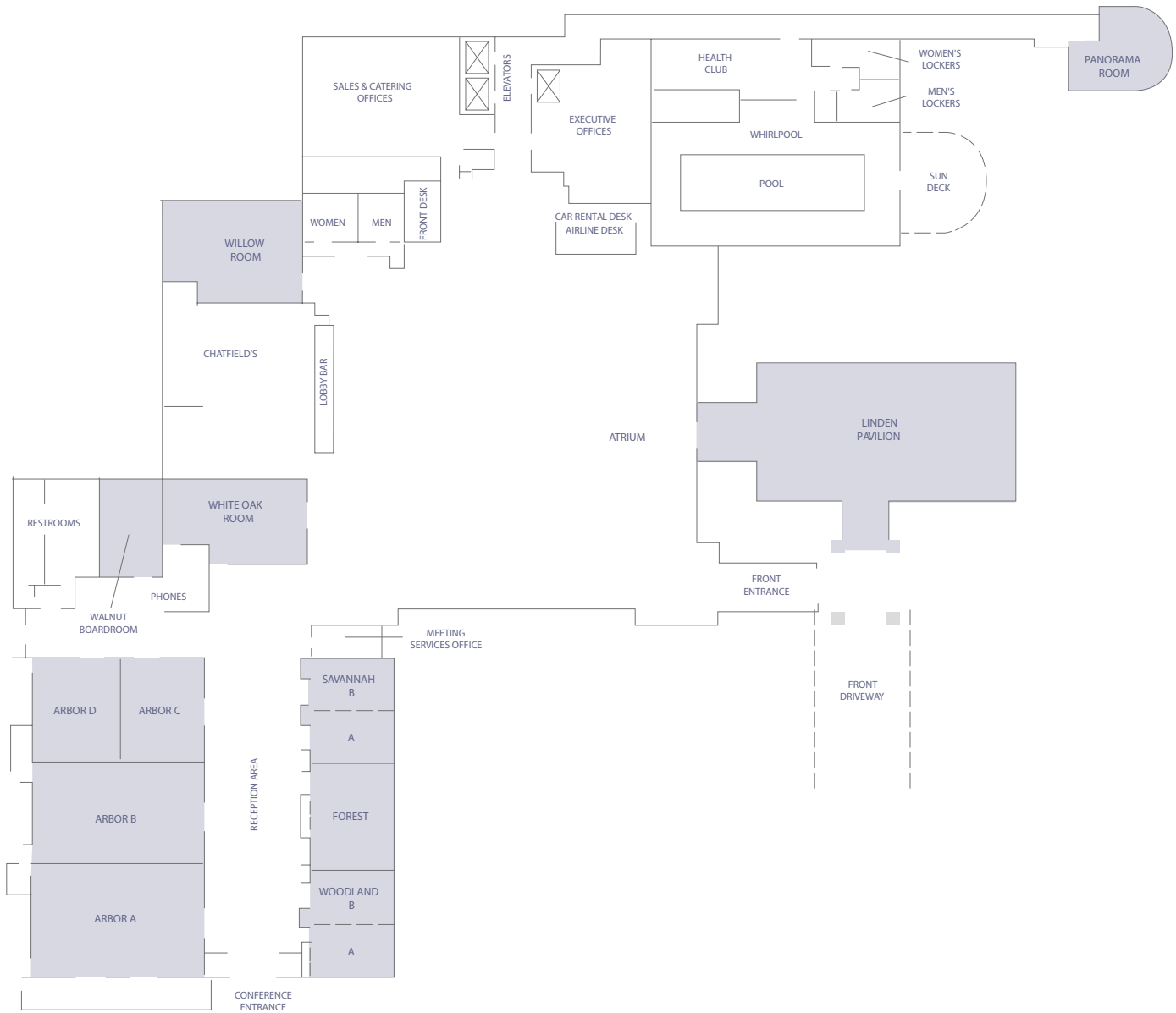
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