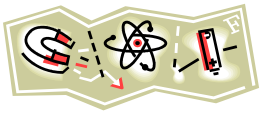

CURPA NEWS

Newsletter of the Council on Undergraduate Research Physics and Astronomy Division
Spring 2016

Message from the Chair

Welcome to this edition of the Physics and Astronomy Division's newsletter. I hope your spring activities have been going well and that you are getting ready for summer. As many of you are well aware, this is a very busy time of year. We just wrapped up celebrating Undergraduate Research Week, NCUR, and Posters on the Hill. With this year's graduation ceremonies drawing near, there will be numerous celebrations recognizing the varied accomplishments of students, faculty, and scientists on academic campuses and by professional organizations.

This summer, the CUR Biennial Conference will be held at the University of South Florida in June. Several presentations will be given by members of the division including a panel discussion of our pilot REU program funded by the National Science Foundation (award number 1358879). Additionally at our upcoming business meeting, councilors will continue discussions of action items related to CUR's strategic plan and our five strategic pillars (www.cur.org/about_cur/strategicpillars/):

- Integrating and Building Undergraduate Research into Curriculum and Coursework
- Assessment of the Impact of Undergraduate Research
- Diversity and Inclusion in Undergraduate Research
- Innovation and Collaboration in Undergraduate Research
- Internationalization and Undergraduate Research

In this edition of the newsletter, you will find a feature article by Dr. Kevin Riggs discussing his former student's experience as a member of the LIGO collaboration, a project she started as an undergraduate that continued through her PhD. Kevin is a member of our division and a former CURPA councilor.

You will also find a summary of Year 2 of our pilot REU program. Although the program was well received by both students and mentors, I regret to inform you that our distributed REU program was not renewed for another funding cycle. Our division has some additional funding available this year to support free two-year CUR Memberships for new faculty! A short article on this, along with the criteria, follows this message. If this is of interest to faculty in your department, please be sure to contact me.

I would also like to thank everyone who took part in the CURPA councilor elections, congratulate those individuals who were elected, and thank those councilors rotating off the council for their service. Specifically I would like to thank Dave, Doug, Horace, Raul, and Sudha for volunteering their time and effort to advocate for undergraduate research. If there is anything the CURPA council can help you with in advocating for and promoting undergraduate research, please contact us.

Finally, I would like to thank Rick Thompson for taking the time and effort to put our newsletters together this past year. If you have something to submit to our next newsletter, scheduled for the fall, please contact him at thompsor@mail.strose.edu. Until then, have a safe and enjoyable summer and we look forward to getting you the next edition of the newsletter in the fall.

Michael Jackson
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Free CUR Memberships for New Faculty!

Does your department have a new faculty member whom you would like to see join the Physics and Astronomy Division at CUR? If so, we can provide them with a no-cost, two-year membership to CUR! Full-time faculty (tenure or non-tenure track) whose appointment started between Fall 2014 and Fall 2016 are eligible. Please have them send an e-mail to

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stating their interest in the program along with a two page CV that has information about their appointment and research area, including publications. Please contact me with questions. Preference will be given to individuals in tenure-track positions with Fall 2016 appointment dates. More than one faculty member per department can receive the award provided funds are available. Our preference is to support faculty across multiple departments. The deadline for nominations is Friday, May 13.

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Detecting gravitational waves began with an undergraduate research experience

The physics world has been buzzing with excitement about the long awaited direct detection of gravitational waves from two in-spiraling black holes announced by the Laser Interferometer Gravitational-wave Observatory (LIGO) collaboration at the National Press Club on Thursday, February 11, 2016. For one of the co-authors of the now famous *Physical Review Letters* paper, Dr. Sarah Caudill, the announcement was the culmination of a decade long participation in the LIGO collaboration that started with an undergraduate research experience while at Stetson University. Sarah actually started out at Stetson University as a chemistry major. She got her first taste of undergraduate research in the summer of 2004 working on a project to measure the expansion of photo-curable polymers using Michelson interferometer techniques with chemistry professor Dr. Tandy Grubbs. After taking her first introductory level course in physics, Sarah became intrigued with the field and immediately switched to the physics major. She became interested in black holes after presenting a talk on the subject in her Modern Physics course. In part due to her research experience at Stetson, Sarah was accepted into the National Science Foundation Research Experience for Undergraduates (NSF-REU) LIGO program at the California Institute of Technology. At Caltech she was able to work with some of the major figures in the LIGO community. One of the highlights of her time there was when she was able to meet one of the founders of the LIGO project, Kip Thorne.

Sarah credits her undergraduate research experiences with her future success:

“Having the ability to participate in undergraduate research opened up a world of opportunities that I would not have had otherwise. Coming from a small town and being the first in my family to attend college, I had little knowledge of the options available to one pursuing a degree in science. As a science major at Stetson University, I was encouraged to take part in a research project fairly early on. This experience taught me that research is often a creative process where one must reevaluate each time an obstacle is encountered. Additionally, I gained experience writing technical documents and presentations. These skills enabled me to successfully apply for a summer undergraduate research fellowship at the California Institute of Technology the following year. I worked for

the Laser Interferometer Gravitational-wave Observatory (LIGO) for three months, developing code, performing statistical analyses, and creating strong connections with a large group of international collaborators. I maintain these connections today, as I continue work with LIGO."

After her LIGO experience at Caltech, Sarah was able to continue her interest in the field by taking an independent study course in General Relativity at Stetson University. During her senior year, Sarah presented her LIGO work at the 2006 Posters on the Hill event in Washington DC, accompanied by her Stetson physics mentor, Dr. Kevin Riggs. They spent the morning advocating to members of Congress in regard to funding for undergraduate research programs like NSF-REU and for continued funding of LIGO and advanced LIGO. At Florida Senator Bill Nelson's office, Sarah talked with Senator Nelson's principle aide on NASA issues about the proposed Laser Interferometer Space Antenna (LISA). Unfortunately NASA eventually declined to take up the LISA mission but the European Space Agency has stepped into the breach and recently launched the LISA pathfinder mission in December 2015. In the afternoon, Sarah presented her Caltech LIGO work at the poster session. Sarah also had the opportunity to visit the Smithsonian Air and Space museum and make a pilgrimage to the Albert Einstein Memorial outside the National Academy of Sciences while in Washington, DC.

About her Posters on the Hill experience, Sarah writes:

"Participating in Posters on the Hill gave me a chance to directly experience the interplay between science and politics. I am now keenly aware of how funding opportunities can make or break a scientific endeavor. Working from inside the field, scientists may think that the value of their projects and results are self-apparent. But, in fact, such thinking can be harmful. Scientists have a responsibility to share the excitement of their research through an open dialog with the community. Recently, LIGO announced the first direct detection of ripples in spacetime, a discovery some are heralding as the most important in the last 100 years. For about a week, my social media accounts were overloaded with news articles, proud family members, excited friends and neighbors, all sharing in the discovery. With the help of programs such as CUR which encourage open dialog with the community and politicians, we can work toward the understanding that scientific discovery truly does belong to all of us."

Dr. Kevin Riggs and Ms. (now Dr.!) Sarah Caudill at the 2006 Posters on the Hill. The title of her poster was "LIGO Detection Efficiency Studies in Searches for Gravitational Waves from Binary Neutron Star Inspirals."

After graduating Summa Cum Laude and Phi Beta Kappa from Stetson University, Sarah completed a Ph.D. in gravitational wave physics at Louisiana State University in 2012 under the direction of Dr. Gaby Gonzalez. Dr. Gonzalez serves as the official spokesperson for the LIGO collaboration. While at LSU, Sarah won the Distinguished Dissertation Award in Science, Engineering, and Technology for her outstanding Ph.D. thesis. Sarah is currently a postdoctoral researcher with the Leonard E. Parker Center for Gravitation, Cosmology and Astrophysics at the

University of Wisconsin – Milwaukee and is an ongoing member of the LIGO collaboration.

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2016 National Conference on Undergraduate Research

The 2016 *National Conference on Undergraduate Research* was held at the University of North Carolina Asheville from April 7 – 9, 2016. This year there were over 80 presentations within the division, along with other interdisciplinary presentations made by physics and astronomy majors. NCUR is a great venue for undergraduate students as the entire conference is focused on the undergraduate experience. Along with presenting their research, students can attend the plenary sessions, graduate school fair, and other conference activities.

Congratulations to all of the student presenters and their advisors. If you are mentoring undergraduate students you might want to encourage them to present their research at NCUR 2017.

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2016 Posters on the Hill

CUR's *Posters on the Hill* will be held on Wednesday, April 20 in the Rayburn building, Washington DC. This year, 60 posters were selected from over 300 completed applications. The students selected to represent the Physics and Astronomy Division are:

- Derek Bradley, University of Northern Iowa, (Advisor: Dr. Tim Kidd), "Development of Ultralight Magnets,"
- Daniel Krolikowski, State University of New York-Geneseo, (Advisor: Dr. Aaron Steinhauer), "WIYN Open Cluster Study: Lithium in Red Giants of the Open Cluster NGC 2158," and
- Meghan Stuart, University of Tennessee at Knoxville, (Advisor: Dr. Christine Nattrass), "Background Subtraction Methods for Precision Measurements of Di-Hadron and Jet-Hadron Correlations in Heavy Ion Collisions."

Additionally, the following students from the Physics and Astronomy Division received an honorable mention:

- William Zimmerman, Towson University, (Advisor: Dr. Vera Smolyaninova), "Metamaterial Superconductors,"
- Theodore Jimson and Michael Smith, Central Washington University, (Advisor: Dr. Darci Snowden), "Modeling Energetic O+ Ions Interacting with Titan's Atmosphere."

Congratulations to the above students and their advisors. As one might expect, reviewers were impressed by the overall quality of the applications and the research being conducted by undergraduates. The *Posters on the Hill* event is held annually, typically during the month of April. If you are mentoring undergraduate students this summer or know someone who is, please keep this program in mind and encourage your undergraduate students to apply. More information about this program can be found at:
www.cur.org/conferences_and_events/student_events/posters_on_the_hill/

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2015 CUR REU Profiles

For the past two years, we have briefly discussed our division's pilot REU program funded by the National Science Foundation (award number 1358879) and the students

who participated. The profiles for the final two students from the 2015 cohort appear in this edition.

The Burrito Timbon Challenge (approximate dimensions are 13 inches long, 4 inches wide, and about 2.5 inches high). Mike Jackson finished the burrito in less than 6 minutes and Chris finished it in less than 8 minutes. Therefore after two years, Research Mentors = 2; REU students = 0!

Christopher Case, Missouri State University: Chris' project, "Properties of Cu doped ZnO thin films grown by spray pyrolysis" was performed at the University of Wisconsin-La Crosse with Dr. Seth King and Dr. G. R. Sudhakaran. Chris is pursuing a degree in physics and he presented his research at the 8th Annual Wisconsin Science & Technology Symposium 2015.

Marija Glisic, University of Washignton: Marija's project, "Time Resolved Tandem Faraday Cup" was performed at SUNY-Geneseo with Dr. Stephen Padalino. Marija is pursuing a degree in physics and she presented her research at 57th Annual Meeting of the APS Division of Plasma Physics in November 2015.

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and
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Your CURPA Councilors

John Armstrong, Weber State University. Integrating Research into the Curriculum Task Force and CURPA Webmaster.

Nadine Barlow, Northern Arizona University. CURPA Secretary and Chair CUR Fellows Committee.

Maria Bautista**, Kapi`olani Community College. Diversity and Inclusion Task Force.

Matthew Beaky, Juanita College. CUR Finance Committee.

Mark Biermann, Valparaiso University. Constitution and ByLaws Committee.

Horace Crogman#, University of California Merced.

Beth Cunningham, AAPT. CURPA Mentoring program.

Michael Jackson, Millersville University. CURPA Chair, CUR Posters on the Hill Committee, Innovation and Collaboration Task Force, and CUR Executive Board.

George Marcus, SUNY Geneseo

John Mateja, Murray State University. CUR/Barry Goldwater Scholar Faculty Mentor Award Committee and NCUR Oversight Committee.

Duncan McBride, formerly at the National Science Foundation. CUR Treasurer, CUR Finance Committee, and CUR Investments Committee.

David McGee#, The College of New Jersey. Internationalization and Undergraduate Research Task Force.

Sorinel Oprisan, College of Charleston. CUR Quarterly Editors Board.

Terry Oswalt, Embry-Riddle Aeronautical University Daytona Beach. Advocacy Advisory Committee.

Raul Peters#, Paine College. Nominations Committee.

Doug Petkie#, Wright State University.

Phillip Reed, Kutztown University.

Toni Sauncy, Texas Lutheran University.

Allyn Smith, Austin Peay State University. CUR Posters on the Hill Review Committee.

Gubbi Sudhakaran#, University of Wisconsin La Crosse. Program Review.

Brian Utter, James Madison University.

Richard Thompson, The College of Saint Rose. Integrating Research into the Curriculum Task Force and CURPA Newsletter Editor.

* Term begins at June 2016 Business Meeting
** Re-elected to new term
# Term ends at June 2016 Business Meeting

CURPA News Deadline

CURPA News comes out three times per year and we welcome your contributions! Please send your submissions, comments, achievements, opportunities, etc. to Rick Thompson (thompsor@mail.strose.edu). Deadline for the Fall 2016 issue is ***September 15, 2016***.