

R·I·T Science+Math

MONTH IN REVIEW

Message from the Dean

I hope your summer is going well. Life does not slow down for good weather in the College of Science, and there is still much activity in our hallways, classrooms, and laboratories.

Gosnell Hall renovations continue this month as workers install a much-needed central air conditioning system. Next summer will be much more comfortable. We have also hosted hundreds of high school and college students for summer internships, camps, REUs, summer undergraduate research fellows, graduate theses, and other programs. It has been a pleasure to see so many fresh faces.



Sophia Maggelakis, Dean

RIT College of Science

Please take time to enjoy the sun and relax with your families and friends. I am looking forward to hearing about your travels when you return in August.

JUNE 2017

The Howard Hughes Medical Institute (HHMI) awarded us \$1M to promote diversity among science majors

We been awarded \$1 million from a private philanthropy to increase diversity and inclusivity among undergraduate science majors and develop a strategy for supporting their success. [The Howard Hughes Medical Institute's Inclusive Excellence Initiative](#) is a five-year science education grant to develop future scientists reflecting the nation's diversity. This is a big deal for our college and our university. RIT was selected from an initial pool of 500 proposals, and we are one of only 24 institutions across the country to receive such an award! This is the first grant RIT has received from HHMI – a very competitive award!



Congratulations to our colleagues who have made this gift possible:

- Dr. Jennifer Connelly (Co-PI), School of Physics and Astronomy
- Dr. Scott Franklin (PI), School of Physics and Astronomy
- Dr. Elizabeth Hane (Co-PI), Gosnell School

of Life Sciences

- Dr. Lea Michel (Co-PI), School of Chemistry and Materials Science
- Dr. Dina Newman (Co-PI), Gosnell School of Life Sciences

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[Rochester Business Journal >](#)

COS establishes Integrated Sciences Academy

Multidisciplinary science education and research is the focus of a new academic unit in RIT's College of Science that brings together researchers with different expertise to invent new ways to approach challenges facing a global society. The Integrated Sciences Academy will focus on implementing specific inter- and multidisciplinary programs within the College of Science and differs from custom-tailored programs offered through RIT's School of Individualized Study.

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NSF undergraduate research programs in NY with 5 REUs in COS

RIT leads universities in New York with seven NSF- funded ([National Science Foundation](#)) Research Experience for Undergraduates (REU) summer research programs, five of which are awarded to the College of Science.

"The REUs help put RIT on the map," COS Dean Sophia Maggelakis said. "We are doing research



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that is of interest to students from other universities who come to RIT to work with our faculty.”



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CCRG study suggests dying stars give newborn black holes a swift kick

New information gleaned from gravitational wave observations is helping scientists understand what happens when massive stars die and transform into black holes. Researcher Richard O’Shaughnessy and collaborators reanalyzed the merging black holes detected by LIGO (Laser Interferometer Gravitational Wave Observatory) on Dec. 26, 2016.

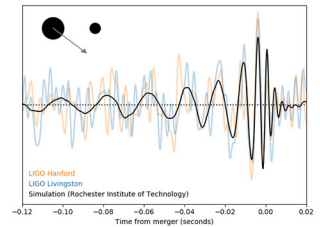


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CCRG's black hole computer simulations help ID third gravitational wave

CCRG researchers continue to make significant contributions to gravitational wave astronomy, with the third detection of gravitational waves and a new black hole 49 times the size of our sun. The LIGO collaboration today announced results from the detection of gravitational waves on Jan. 4. The discovery will be published in the journal *Physical Review Letters*.



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[TopExaminer >](#)

Joel Kastner named interim AST director

Joel Kastner will be the Interim Director of the RIT Astrophysical Sciences and Technology program until June 30, 2018, while Andrew Robinson is on leave. John Whelan will continue serving as AST Graduate Program Coordinator.



Alisha Balkum hired as new academic advisor

Alisha Balkum, formerly of Binghamton University, has been hired as the new COS academic advisor assigned to Chemistry, Biochemistry, and Environmental Science undergraduates. Ms. Balkum has an MS in Higher Education and Student Affairs Administration from Buffalo State College. She has also previously worked at Drexel University, Medaille College, Daemen College, and Buffalo State.



COSSAC hosts "Next Level Networking" retreat





The College of Science Staff Advisory Council hosted its annual retreat June 14 at the Flower City Community Room at Five Star Bank on Westfall Road. COS staff participated in an extended networking exercise that helped them learn more about one another. There were yoga lessons, a presentation about cloud-based collaboration platforms, and a discussion of professional development opportunities.



Sponsored Research

Congratulations to our colleagues who received external funding to support their research projects and students:

Jie Qiao, CIS, is the PI on a \$355,962 National Science Foundation grant for a project entitled "GOALI: Optical Differentiation Wavefront Sensing for High-Dynmaic-Range High-Sensitivity Freeform Metrology." This project will promote a quantum leap forward in optical metrology for freeform optics by developing an innovative optical differentiation wavefront sensor (ODWS). Simultaneous measurements of an optical surface in reflection with a coordinate measurement machine and ODWS will allow for large aperture, high dynamic range, and high accuracy freeform characterization in the optical manufacturing environment.

Manuela Campanelli, CCRG, is the PI on a \$300,000 National Science Foundation grant for a project entitled "Collaborative Research: Curvilinear and

Multipatch Methods for General Relativistic Astrophysics in the Gravitational Wave Era."

Paul Wenger, SMS, is the PI on a \$253,052 National Science Foundation project entitled "Collaborative Research: Data Integration in Undergraduate Mathematics Education." The goals of the project are to develop in-class modules using real-world data sets and computational tools to enhance student engagement and attitudes towards mathematics. The data sets will be sourced primarily from the GIS building. The modules will be developed for mathematics courses ranging from Calculus I to Differential Equations. The project also includes a significant professional development component, including development for RIT faculty in each year of the grant and a workshop in the last year for faculty members from other institutions.

Baasansuren Jadamba, SMS, is the PI on a \$135,000 National Science Foundation grant for a project entitled "A Novel Regularization Based Computational Framework for State-Constrained Optimal Control Problems." This project is a thorough study of the conical regularization focusing on the following aspects:

1. Optimal control with scalar and vector-valued objective.
2. Error estimates for the conical regularization.
3. Extensions to optimal control for variational inequalities
4. Applications to phase field models, supply chains, and elasticity.

Richard O' Shaughnessy, CCRG, is the PI on a \$90,000 National Science Foundation grant for a project titled "Gravitational waves as a tool of astronomical discovery." LIGO has identified gravitational waves (GWs) from coalescing black hole binaries, initiating a revolution in astrophysics. This award will support the following transformative research programs: (i) Estimating properties of GW sources, and (ii) Data-driven astrophysics with gravitational waves. This award will enhance the research activity of the team and postdocs, while catalyzing broader efforts at RIT's Center for Computational Relativity and Gravitation, by tightly integrating GW data analysis, astrophysics, and numerical relativity. This proposal will support training of a postdoc and two graduate students.

Carl Salvaggio, CIS, is the PI on a \$82,500 Harris Corporation grant for a project titled "Infrastructure Monitoring Using Aerial Drone Imaging

Systems." The proposed research project will focus on Requirements Definition, Signature/Phenomenology Research, Algorithm Development and Testing, Integrated Workflow Development, and Technology Transfer and Deployment.

Jan van Aardt, CIS, is the PI on a \$70,200 US Department of Agriculture Forest Service grant for a project entitled "A New Tool to Monitor the Resilience of Mangroves to Sea Level Rise." The goal of this project is to test out a new tool to measure mangrove elevation and accretion rates in Pohnpei, Federated States of Micronesia. The information can be used to monitor how quickly mangrove forests soil surfaces are raising (or falling) relative to sea-level rise and how deforestation and development might impact that ability. RIT will test the use of a low-cost, terrestrial light detection and ranging system to rapidly measure the elevation of mangrove forest floor over an area that is much larger than conventional techniques that take days to weeks to measure and analyze.

Sukanya Chakrabarti, SoPA, is the PI on a \$186,000 National Aeronautics and Space Administration grant for a project titled "Galactoseismology: From the Milky Way to XUV Disks." Dr. Chakrabarti will investigate disturbances in the galactic disk of the Milky Way and galaxies in the Local Volume to characterize the perturbers and the dark matter distribution. She will also correlate the disturbances with the galaxy colors and SED to make a direction connection to observables.

Kara Maki, SMS, is the PI on a \$50,000 Bausch and Lomb grant for a project titled "Mathematical Model & a Computer Simulation of the Motion of a Toroidal lens Under the Influence of Shear Forces Produced by an Eyelid During a Blink." In recent work supported by Bausch & Lomb, Maki and her team have developed and applied two models of the coupled fluid mechanics and solid mechanics of a contact lens on an eye. They propose to develop a model of the stresses imposed on a contact lens by the eyelid during a blink. We will couple this with the centration model, so we can simulate the displacement of a lens during a blink and its re-centering under the influence of suction pressure gradients.

Michael Zemcov, SoPA, is the PI on a \$39,143 grant from the National Aeronautics and Space Administration and University of California-Irvine for a project entitled "Cosmic Dawn Intensity Mapper." The project is a mission

concept study to be submitted to the US astronomical community in preparation for the 2020 Astronomy Decadal Report. The proposed NASA Probe Class Mission Concept called "Cosmic Dawn Intensity Mapper "(CDIM) will be capable of spectro-imaging observations between 0.7 to 7 microns in the near-Infrared.

Scott Williams, SCMS, is the PI on a \$25,000 NSERDA / High Tech Rochester grant for a proposal titled "Additive Manufacturing of Perovskite Photovoltaics." Perovskites, a new class of photovoltaic material, have recently reached 22.1% power conversion efficiency, comparable to that of silicon's 25.6%, opening the door to commercial potential. Furthermore, perovskites lend themselves well to additive manufacturing, in contrast to the subtractive techniques used by silicon, allowing scientists to make many devices with less material. This investigation seeks to determine the most efficient and scalable method to printing perovskite photovoltaics.

Susan Farnand, PoCS, is the PI on a \$21,834 Xerox Corporation grant for a project entitled "Evaluating Color Xerographic Print Quality." The project will provide a jointly-agreed color research study while obtaining print samples of the Xerox test patterns from a variety of color printers to be identified by Xerox. There will be two portions of the project, Xerox proprietary and a color research project.

Scott Brown, CIS, is the PI on a \$16,000 Department of Defense Institute for Defense Analyses grant for a project titled "Applications of DIRSIG to events at the Nevada Test Site and Pacific Proving Grounds." The Institute for Defense Analyses (IDA) is analyzing thermal radiation propagation from historic tests at the Nevada Test Site and Pacific Proving Grounds. IDA is using DIRSIG to propagate thermal radiation in a complex scene and seeks support from RIT. RIT will assist IDA in setting up, performing, and debugging simulations using DIRSIG.

Social Media



CCRG hosts alumni discussion of gravitational waves and black holes

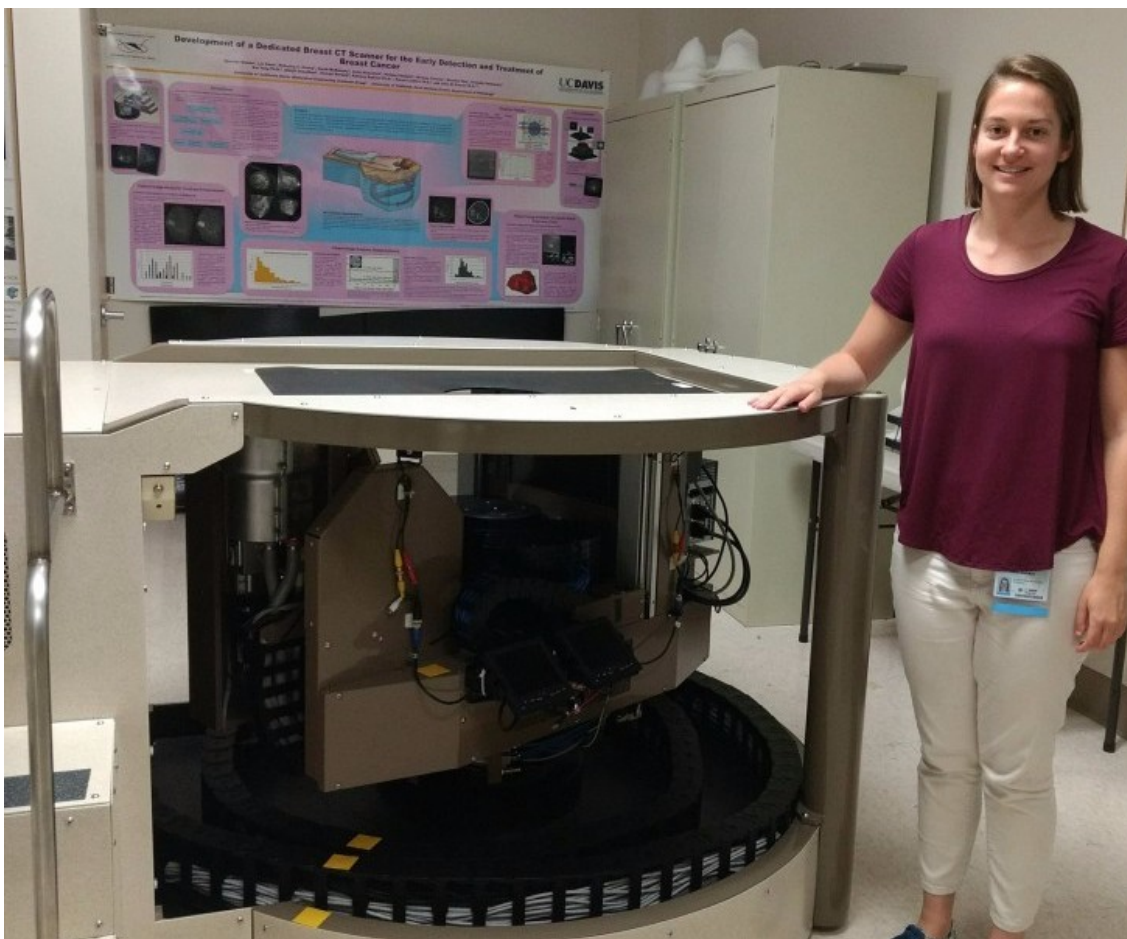
Six generations of scientists and students met together to talk about gravitational waves and black holes at the Center for Computational Relativity and Gravitation's new office suite. COS Dean Sophia Maggelakis and REU students also attended. [Facebook Album >](#)





REU students attend ASL Bootcamp


NTID Lecturer Marguerite Carrillo leads an American Sign Language bootcamp program for students in RIT's Research Experience for Undergraduates (REU) program in Multimessenger Astrophysics, as well as other summer research students. [Facebook Album >](#)




Amy Becker finishes first year at UC-Davis

Amy Becker, a 2016 alumna of the Chester F. Carlson Center for Imaging Science, finished her first year as a Ph.D. student in biomedical engineering at the University of California, Davis. Amy is studying imaging methods that will lead to more accurate early detection of breast cancer and ultimately higher survival rates.

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Newsmakers



Matt Hoffman visits the Harley School to talk about Great Lakes pollution

Matt Hoffman, SMS, talked to fifth graders at the Harley School on May 30 about plastic pollution in the Great Lakes. Using a hair dryer, Hoffman, seated above, simulated wind and currents in a small aquarium and added drops of blue food coloring to show water layers mixing beneath the surface. Hoffman, an associate professor in RIT's School of Mathematical Sciences, estimates nearly 22 million pounds of plastic wind up in the Great Lakes system every year. — *University News*

Joel Kastner, SoPA, was a discussion leader at the Gordon Conference on the Origins of the Solar System for a session titled "Making a Habitable Planet" June 18-23 at Mount Holyoke College in South Hadley, Mass.

Dina Newman, GSOLS, presented a three-hour workshop titled "Teachers on Teaching ACT: Getting Students to Work Harder and Smarter: ILI/Fram Course Redesign on Building Student Critical Thinking" on June 1 at RIT.

David Messinger and Roger Easton, CIS, were featured in a June 16 *Rochester Democrat and Chronicle* story headlined ["Conference shows how imaging science can help uncover secrets of history"](#)

Ernest Fokoué, SMS, was quoted in a June 23 *Rochester Democrat and Chronicle* story headlined ["Hottest jobs are in data science."](#)

Brendan John, Computational Mathematics and Computer Science '16 and Salamanca native, was featured in a June 22 *Salamanca Press* story headlined ["Aiming to Inspire."](#)

Brian Koberlein, SoPA, was quoted in a June 16 Futurism article headlined ["An Ambitious Spacecraft Is Set to Advance Humanity Further Than We Dreamed."](#)

Brian Koberlein, SoPA, and Roger Dube, COS, were guests on WXXI's Connections with Evan Dawson in a show titled ["NASA's plan to touch the sun."](#)

Kamran Binaee, a Ph.D. student at CIS, delivered his talk, "Modeling Hand-Eye Movements in a Virtual Ball Catching Setup Using Deep Recurrent Neural Network," at the annual meeting of the Vision Science Society May 19-24 at St. Pete Beach, Florida.