Tufts UNIVERSITY

SCHOOL OF ARTS AND SCIENCES

Department of Physics & Astronomy

Summer 2012

Dear Friends of Tufts Physics & Astronomy,

Not so very many years ago I was the youngest faculty member in the department — a testament not to my youth but to a long drought in faculty hiring. Since then the complexion of the department has changed dramatically. Today more than a third of our faculty members have been here for less than ten years, and five have joined us in the past three. They are outstanding researchers and teachers, and they have brought new research areas, experimental and theoretical methods, collaborations both within Tufts and beyond, educational innovations, seminar series, and an infectious excitement and enthusiasm that is felt by their colleagues and students alike. At the same time, there has been no letup in the accomplishments of the veteran faculty members. Below we offer profiles of our two newest additions, as well as selected highlights of another year of faculty and student achievement.

Our Ever-Evolving Department

Additions

Assistant Professor Timothy Atherton earned his Ph.D. in physics in 2007 from the University of Exeter in the United Kingdom. He moved to Case Western Reserve University in Cleveland, Ohio as a postdoctoral scholar in the research group of Professor Charles Rosenblatt, and then became visiting assistant professor of physics at CWRU in 2009. Tim's work focuses on theoretical problems in "soft matter," an exciting field encompassing foams, gels, colloids, liquid crystals, and much biological material. While his research is fundamental, this interdisciplinary work is of great practical and commercial importance. For instance, Tim has worked with the Sharp Corporation and the Hewlett-Packard Company to better understand the physics of new types of liquid crystal display. Tim is an avid snowboarder and kite-surfer and has produced a number of art installations for shows exploring the relationship between science and art. He is also one of the co-organizers of a recent session at the American Physical Society to enhance the visibility of LGBT men and women in physics.

Assistant Professor Pierre-Hugues Beauchemin, known to his friends and colleagues as Hugo, received his Ph.D. in physics from McGill University in 2005. His graduate work explored aspects of a universe with more than four

dimensions and of derived measurable consequences that could confirm the extra dimensions hypothesis. This work placed him at the intersection of theoretical high energy physics, experimental physics, and cosmology. He continued his studies as a postdoctoral research associate at the University of Toronto, moving solely to experimental high energy physics. During this time, he joined the CDF (Collider Detector at Fermilab) experiment and empirically tested the theoretical predictions that he formulated in his doctoral thesis. In 2008, Hugo joined the University of Oxford as a postdoctoral research assistant to work on the ATLAS experiment at the Large Hadron Collider. Most of his time during 2010 and 2011 was spent coordinating 150 researchers working on precision measurements regarding the physics of W and Z bosons. Hugo and his wife Genevieve, an artist, have two young children: Raphael—six years old and already extracting DNA from fruits—and Marine, a four-year old princess.

Retirements

After thirty years, *Research Professor Tomas Kafka* retired in January 2012. A stalwart participant in all phases of experiments conducted by the High Energy Physics group at Tufts, Professor Kafka played a major role in all of the neutrino physics experiments for those thirty years. His colleagues know him to be a careful, thorough researcher whose passion for verity with measurements and analysis has provided guidance and inspiration on many occasions. We thank Professor Kafka for his years of service to the department and the School of Arts and Sciences at Tufts University.

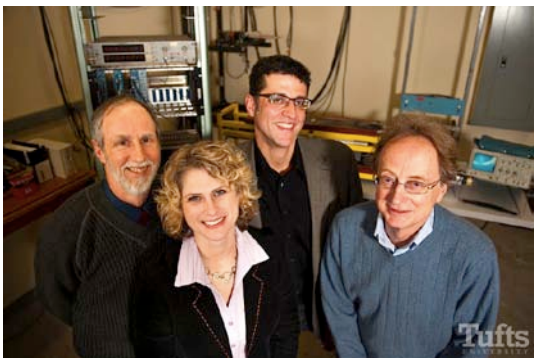
Promotions

We would like to congratulate….

Professor José Juan Blanco-Pillado, who was awarded tenure and promoted to the position of associate professor of physics this spring.

Professor Ken Olum, who was promoted to the position of research professor of physics this past fall.

News and Events



The Steven J. and Joyce J. Eliopoulos Endowed Fund for Undergraduate Research in Physics and Astronomy

This semester the Department of Physics & Astronomy was the proud and grateful recipient of a generous gift from Steven J. and Joyce J. Eliopoulos to establish a fund to support Summer Scholar opportunities for undergraduate physics and astronomy students. Mr. Eliopoulos is a 1989 alumnus of the department whose senior thesis, an apparatus to measure the muon lifetime, is still in use in the undergraduate advanced laboratory course. The owner and director of Gravity Inc., a Medford-based media production company, Steven likens Tufts University to "home." He and his wife Joyce know their personal connection to the fund will afford the chance to keep them connected to the future of physics, which rests with the students. We offer our sincere gratitude to the Eliopoulos' kindness and generosity. To learn more about giving opportunities, contact Roger.Tobin@Tufts.edu.

Tufts Students Present at the American Physical Society March Meeting

This spring both graduate and undergraduate Tufts Arts and Sciences physics students had the opportunity to present their work at the annual March meeting of the American Physical Society, the largest physics meeting in the world. Presenters included the following. (*undergraduate)

Staii Lab

Oral Presentations

- Christopher Kehayias,* *Combined transport-Scanning Probe Microscopy studies of reduced graphene oxide sensors*
- J.D. White, *A quantitative analysis of axonal growth and connectivity in cortical neurons*
- D. Rizzo,* *Conformational changes of surface immobilized proteins studied by combined Atomic Force Microscopy and Fluorescence Spectroscopy*

Poster Presentations

- S. Bernath,* *Simulating growth dynamics of neurons on substrates.*
- R. Beighley,* *Controlling growth and electrical connectivity of neuronal cells patterned on surfaces.*

Cebe Lab

- Wenwen Huang, *Self-assembly Morphology and Crystallinity Control of Di-block Copolymer Inspired by Spider Silk*
- Qian Ma, *Jamming and Unjamming of the Rigid Amorphous Fraction*

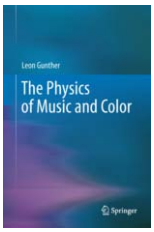
- Wenwen Huang, Lorne Farovitch, Parisa Haghighi,* Leonard Macisco,* Tyler Swob.* *PVDF/PVIm polymer blend films for fuel cell membranes.*
- Kevin Li,* *Properties of PET/PLA Electrospun*

- J. Rahamim,* *Kelvin Probe Microscopy and Electrostatic Force Microscopy of reduced graphene oxide platelets.*

Blends

- Qian Ma, Bin Mao, Erika Simona Cozza, *Structure of Oriented PLA/Graphene Nanocomposite Fibers*
- Bin Mao, *Rigid amorphous fraction of Nylon 11 determined from TMDSC*

Professor Leon Gunther is proud of the release of his new book, *The Physics of Music and Color*, this past fall. Based upon a course on the topic that has been taught in the Tufts University School of Arts and Sciences since 1973, the book aids readers in studying nearly the entire gamut of the fundamental laws of classical as well as modern physics. The book is currently available via Springer Science and Business Media.



The Department Goes Social

This spring the department decided to enter the social networking craze and join Facebook. We hope to use this media channel to reach out more to our friends, alumni, current and prospective students, prospective donors, and all interested parties. You may join our network at: http://www.facebook.com/pages/Department-of-Physics-Astronomy-SAS-Tufts-University/178996428869415. We welcome your suggestions and input.

In the Spotlight

Alumna Natalie Wolchover, A'08

Current Occupation: Staff Writer at Life's Little Mysteries, a science website where she reports on cool new research, answers common science questions, and debunks paranormal claims such as UFO sightings.

How do you use your physics degree and/or knowledge in your line of work?

…Learning physics instills you with a logical way of thinking, not just about physics problems but about problems in all areas of science, and life. When I'm consulting experts for an article I'm writing, my familiarity with the scientific method enables me to know what questions to ask, and what aspects of the topic need to be explained for lay readers.

Did the physics department prepare you for your current career path?

…Though I did not choose to pursue academic research, my experience in the lab as an undergrad gave me an understanding of the scientific process that has helped tremendously in my work as a science writer. Tufts School of Arts and Sciences also looks impressive on a résumé, regardless of what career path you end up on.

What is your favorite memory of your time in the Tufts physics department?

…a "God does not play dice" moment à la Albert Einstein — a rite of passage of every physics major— and a transformative realization about the wondrous strangeness of the universe!

To read more visit our website, http://ase.tufts.edu/physics

A Year of Distinction

Professor Peggy Cebe with President Obama

Faculty and Staff

On November 15, 2011, President Barack Obama named *Professor Peggy Cebe* one of a select group of recipients of the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. The award recognizes the crucial role that mentoring plays in the academic and personal development of students studying science and engineering—particularly those who belong to groups that are underrepresented in these fields. Professor Cebe has mentored more than 100 undergraduate students in her 24-year career, and since 2003 has offered a summer research program for deaf and hard of hearing interns. She also promotes science to such students by visiting middle and high schools for the deaf performing demonstrations and hands-on experiments and discussing STEM careers.

Students

Spencer Smith ('G) was recognized for his exceptional teaching efforts with the Graduate School of Arts and Sciences' *Outstanding Contributions to Undergraduate Education* award. This award recognizes excellence as a teaching assistant or in other roles such as mentoring undergraduates for students in the arts, humanities, natural sciences, or social sciences.

Daniel Rizzo ('12) was awarded the Amos Emerson Dolbear Scholarship, and *Sawyer Bernath* ('12) and *Natalie Perry* ('12) both received the N. Hobbs Knight Scholarships in Physics. *Jake Chiam, Seth Aschen, Gabriel Siu, Christopher Spear, Jordan Stinson, Jesse Zhang,* and *Ramanjit Singh* received 2012 Howard Sample Prize Scholarships in Physics.

Congratulations!

The department would like to congratulate the 2012 graduates.

Bachelor of Science Degrees

- **Sawyer Bernath**, B.S., Physics
- **Emir Magden**, B.S., Electrical Engineering/Physics
- **Eric Morrissey**, B.S., Physics
- **Natalie Perry**, B.S., Engineering Physics
- **Daniel J. Rizzo**, B.S., Engineering Physics
- **Eva Rivlin,** B.S., Combined Degree-SMFA/Physics
- **George Thompson**, B.S., Physics

Master of Science Degrees

- **Jonathan Poage**
- **Katie Thorne**

Doctoral Degree

- **Qian Ma**, Condensed Matter Physics, Adviser: Peggy Cebe
  Thesis: *Effects of Crystals, Nano-reinforcement, and Electrospinning on Confinement in Semicrystalline Polymers*

We are proud of your work at Tufts and look forward to the great things in your future.

Sincerely,
Roger G. Tobin, Chair

Tufts Physics Tidbit

The "Gravity Stone" located between Eaton Hall and Goddard Chapel, was part of a donation by Roger W. Babson intended to support research in the fields of gravity and antigravity. Babson's gift later became the basis for the Tufts Institute of Cosmology. In 1962 a group of students and employees tested whether or not the massive granite slab itself would defy gravity, by digging a large hole underneath it. It didn't. A cycle of burying and digging up the stone continued until the early 1980s. It has become a tradition for each student who receives a doctorate in cosmology to have an apple dropped on his or her head in front of the stone.

Newly-minted Ph.D. Handhika Ramadhan receives the honor from Professor Blanco-Pillado.

We welcome your news, stories, and ideas for our future newsletters. To contact us or to be added to our mailing list, please email newsletter editor: Shannon.Landis@Tufts.edu. We would especially like to hear from recent graduates of the program (undergraduate or graduate) about what you're doing!

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