Greetings! We have been toying with the idea of keeping in touch with our physics alumni through a newsletter, and here it is. If all goes well, you’ll hear from us annually, with updates of all of the exciting news happening in the physics department.

There was plenty of activity in the department this past year. In order to remedy the problem of sabbatical replacements on a yearly basis, the administration approved a tenure-track position for the department. After a rigorous search, we are delighted that Madeline Wade and Leslie Wade accepted a joint-appointment for this new position.

The class that graduated in 2015 had ten physics majors. Many of these students have been accepted to prestigious graduate schools and are planning to pursue degrees in physics, mechanical engineering, material science, and architecture.

We have more than ten physics majors in each of the incoming senior and junior classes. In fact, there are nineteen students registered for the fall’s Electricity and Magnetism course, which we think is a record!

As you read the following pages, you’ll realize that the Hilbert space of a Kenyon-physics-major is pretty vast. Our students have had opportunities to visit national labs and to participate in international conferences. Due to the thriving Friday-Colloquium-Series, students are able to hear talks by outside researchers as well as their peers. Several of our students continue to participate in the Summer Science Program, pursuing some exciting research projects. At times, these projects have culminated in senior honors projects. Friday lunches, with faculty and students, continue to invigorate our sense of community.

We are always eager for news from you, so stay in touch.

Enjoy reading the newsletter!

Frank Peiris
Professor of Physics
Department Chair

Professor Madeline Wade

Maddie joins the Department of Physics Fall 2015. Maddie is a member of the LIGO (Laser Interferometer Gravitational-wave Observatory) Scientific Collaboration, which is one of the leading efforts to make direct gravitational-wave observations. She works on both calibration of the LIGO interferometers and searches for gravitational waves from the inspiral and merger of two massive, compact objects, such as neutron stars and black holes.

Professor Leslie Wade

Les also joins us Fall 2015, and he too is a member of the LIGO Scientific Collaboration. His research includes searching for gravitational waves from binary systems and subsequently decoding the information carried in these waves. In particular, he has worked on estimating the source parameters of binary neutron-star systems in an effort to determine the neutron-star equation of state.
In January 2015, Professor Paula Turner accompanied 6 students to participate in the APS Conference for Undergraduate Women in Physics held at the University of Michigan.

In August, five students will be attending and speaking at the Kenyon/MIT undergraduate cosmology symposium. This is the fourth time Kenyon students have participated in this annual event and it is becoming a tradition for our research students.

Nine students and two faculty members boarded a plane in March to attend the American Physical Society conference. This annual event, held in San Antonio, Texas, brings together almost 10,000 physicists.

This past Fall, physics students took a road trip to Argonne National Laboratory near Chicago. The students were impressed by the Advanced Photon Source, a large multi-billion dollar facility that produces some of the brightest x-ray beams in the world. They also visited the Nuclear Energy Exhibit that showcases Argonne’s rich heritage in the development of nuclear reactors and its current role in the development of next generation reactors and fuel cycle technologies. On their way back, they stopped by Northwestern University for an informative presentation about their graduate program in physics, and finished off the proceedings with Chicago style pizza.

From left to right: Students Tim Scully, Furqan Dar, Robin Belton, Jacob Hilmes, Matthew Carney, Lucas Henwayer, Hanning Wong, Tracy Chmiele, Derek Fioret, Brian Pragacz, Ellen Holmgren, Christian Solonio, Caroline Popiel, and Director of Laboratories, Gordon Loveland '89. (Not pictured: Jan Kmetko)
The Physics department was excited to graduate ten students this year. Prior to commencement festivities, the faculty and students gathered for the annual senior dinner and a game of cricket.

**Senior Exercise Topics**

- **Jonathan Amador** "Exploring Complex Circuits Using the Node-Voltage Method"
- **Alexander Christoff** "The Navier-Stokes Equations and Their Applications to Nanotechnology"
- **Nicholas Connolly** "Surety of Security: Exploring Quantum Cryptography Through the BB84 Protocol"
- **Lucas Herweyer** "Dye Sensitized Solar Cells"
- **Aidan Lee** "Exploring the Optical Properties of IR Semiconductors Using Ellipsometry"
- **C. Ross Mauck** "GPU Acceleration of 3D Lattice Simulations"
- **Michael Morgan** "Coincidence Spectroscopy"
- **Timothy Scully** "Total Reheating the Universe With SU(2) Gauge Fields"
- **Daniel Seidman** "SQUID (Superconducting Quantum Interference Device) Microscopy"
- **Winston Ward** "Bell's Theorem: Quantum is Weird and Awesome. A Look at a Theory of Local Hidden Variables."

**Honors in Physics**

Timothy Scully was awarded high honors for his honors project "Reheating the Universe", conducted with Professor Tom Giblin.
Summer Science 2015

Hayes Hall is buzzing with activity this summer with eight students pursuing their research projects. Students work closely with faculty members for 8-10 weeks, exploring an interesting problem related to the research field of the faculty member.

Arthur Conover ’17  Lattice Simulations With Gravity
Eliana Crawford ’17  Ellipsometry-based Surface Plasmon Resonance Technique for Biosensing
Furqan Dar ’16  Simulating Non-Linear Massive Gravity Models
William Kyle ’17  Principles of Confocal Microscopy
Eva Nesbit ’16  Nonlinear Physics at the End of Inflation: Gravitational Waves
Haifeng Qiao ’16  Exploring the Effective Mass of Semiconductors Using Infrared Faraday Rotation
Zach Weiner ’16  Dynamical Studies of Non-Abelian Gauge Fields: Cosmic Inflation and Reheating
Hanning Wong ’16  Finite Size Effects in the 2D-Ising Model

Prize Awarded

The past year was a special one for Arthur Conover ’17. He was awarded the Elbe Johnson prize in physics at this year’s Honor’s Day celebration. In addition, Conover was the national champion in the 1,650-yard freestyle event, which he won in NCAA record time.

Alan Kaicheng Li ’16 had the opportunity to work at CERN National Labs (Switzerland) during the Spring semester, pursuing a project related to particle physics.

Society of Physics Students

Tim Scully, the SPS-president notes that the past year’s SPS activities offered many opportunities for both faculty and students to bond outside the classroom. SPS held events such as movie nights and shared meals to help create a community among all four graduating classes. While most SPS events took place on campus, the highlight of the year was the trip to Chicago, visiting Argonne National Laboratory and Northwestern University. Overall, the year’s greatest success was building and maintaining the camaraderie and passion for physics that has defined the physics department. Eva Nesbit, incoming President for SPS, has big plans for the coming year. While she expects to organize many of the events from past years, she also has a few surprises hidden up her sleeve.
In the past year, the department was fortunate to receive funding from the administration to replace two instruments that have served our students well for many years.

In 2004, through a grant from the National Science Foundation, the physics department purchased a scanning probe microscope (with both AFM and STM capabilities) that was employed in several courses in the past ten years. This instrument was recently replaced with a Bruker Multimode 8 Nanoscope (see photo), with both AFM and STM capabilities plus additional functionalities that will undoubtedly keep our students quite busy!

The newly-purchased Nanoscope (Bruker, Multimode 8) is used by Eliana Crawford ’17 for her research work this summer.

An AFM-image obtained for a layer of silica spheres. The spheres [diameter ~ 50 nm] was deposited on a glass substrate.

The powder X-ray diffractometer, used in courses such as Advanced Lab, Condensed Matter Physics and Optics, will be replaced by a state-of-the-art X-ray diffractometer capable of studying powders as well as thin films. In addition to X-ray diffraction, students will be able to perform X-ray reflectivity measurements using the new instrument that will be installed in the fall of 2015 (Rigaku-Smartlab, see photo).