

# PHYSICS

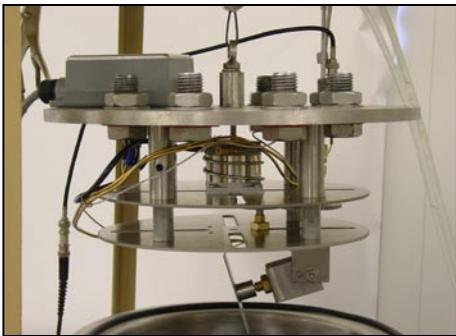
N E W S L E T T E R

Millersville University, Department of Physics ♦ [www.millersville.edu/physics](http://www.millersville.edu/physics) ♦ Fall 2009

## General Update

Once again we find ourselves with the fall semester well underway with summer only a memory.

There is some exciting news from last spring. Dr. Natalia Dushkina was granted tenure and was also promoted to the rank of associate professor. Dr. Dushkina joined the department in the fall of 2004. Since then she has taken responsibility for our general education laboratory course, PHYS 103, which is designed for non-majors. She has also regularly taught Techniques in Mathematical Physics, an advanced course taken primarily by our majors. In addition to her regular teaching, she and Dr. Gilani developed a new stand-alone optics laboratory course to be taken by all the B.S. in Physics majors. This course was offered for the first time in the fall 2007 semester and since then has grown in popularity. Majors from other disciplines have found the course to be a very useful interdisciplinary experience. Along with her classroom work, Dr. Dushkina has supervised a number of successful senior research projects and has maintained a viable national and international research presence. Her promotion and tenure are well deserved and merit our warm congratulations.



*State-of-the-art vacuum deposition system for the manufacture of thin films. The apparatus was designed and constructed by Dr. Gilani and a physics major Drew Pulsifer.*

Along with all the usual teaching and normal research activities, we have a number of exciting senior research projects getting started. Dr. Sean Hendrick has two investigations underway. One is a "Survey of Supernova Remnants in the Large Magellanic Cloud with the Chandra X-ray Observatory". Supernovae are among the most violent events observed by astronomers and, rather remarkably, are responsible for most all the elements beyond helium found in the periodic table. We owe our very existence to supernovae. Analyzing the remnants of these explosions can give clues on their cause and origin. In addition to the supernova project, Dr. Hendrick and a student are also undertaking a "Spectral Analysis of X-ray Binary Systems".

Much of our knowledge about stars and their classifications come from an analysis of binary systems. Binary x-ray systems may often involve a black hole as one of the companions. The extreme conditions generated by a black hole produce some very interesting physics which can be investigated using the x-ray data.

Dr. John Dooley and a student are analyzing photon momentum using a magnetic torsion pendulum. This is an experiment you can try at home. Take an ordinary camera flash and hold it a centimeter or so from a reflective frying pan. Listen carefully as the flash is activated. You'll hear a soft but distinctive ping as the light interacts with the metallic surface of the pan. What's going on here? Is it really a transfer of photon momentum to the metal or are there subtle thermal effects producing the noise? Dr. Dooley and the student plan to carry out the experiment in a vacuum using a very sensitive torsion balance. The balance is a magnetically suspended plane free to rotate. Since the vacuum should eliminate thermal effects, a simple calculation predicts how the photon momentum should influence the rotation of the suspended surface.



*A student strikes a tire with a hammer. By analyzing the acoustic response of the tire, Dr. Dooley and the student hope to gain insight into the structural integrity of the tire.*

These and other student projects should make for an exciting academic year. Dr. Dushkina and a student are looking at optical and electrical properties of micron sized monolayer structures while Dr. Mehmet Goksu is involved in an analysis of the Seebeck effect. The classical Seebeck effect predicts that a temperature gradient in a metal should be accompanied by an electric field opposite to the temperature gradient. However, for most materials the classical picture breaks down and one must invoke a quantum picture of the electrons involved. Meanwhile, Dr. Tariq Gilani and a student are analyzing the physics of a rail gun, a device which propels a metallic projectile using magnetic fields.

## How YOU Can Help

Like what you read about physics alumni, faculty, students and programs? Please keep our programs strong and support physics students. Give on-line @ [www.millersville.edu](http://www.millersville.edu). Click on the "Giving" tab OR send your gift to Millersville University, Development Office, P.O. Box 1002, Millersville, PA 17551-0302. Gifts can be restricted or unrestricted.

### **HOMECOMING WEEKEND ACTIVITIES**

**Saturday, October 24**

**Science and Mathematics Alumni Gathering, 12:30 p.m. – 2:00 p.m.** (Caputo Hall, Steinman Courtyard)  
Science and Mathematics alumni are cordially invited for dessert and beverages. Free. Reservations are requested by registering online at [www.villealumni.com](http://www.villealumni.com) or call the Alumni Office at 717-872-3352 or 800-681-1855.

**Science and Mathematics Student Research Poster Display, 8:00 a.m. – 4:30 p.m.** (Caputo Hall Lobby)  
Current undergraduate and graduate research poster papers will be displayed.

# H i g h l i g h t s

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There are a number of University activities that you should mark on your calendars.



## Homecoming

Homecoming is the weekend of October 24, this year we will offer dessert and beverages in the Steinman Courtyard at the Argires Science Complex. This is an excellent opportunity to meet former classmates, chat with current students, reminisce with faculty, and tour the facilities. See the previous page for more information. In addition, there will be a Science and Mathematics Student Research Poster Display; this provides an excellent opportunity to see some of the current student research activities within the School.



## Brossman Science Lecture

The 25<sup>th</sup> Annual Brossman Science Lectureship is on Thursday, November 5<sup>th</sup>. This year the speaker is Mr. Jeff Lieberman: Musician, Roboticist, Sculptor, Photographer, and Host of the Discovery Channel's *Time Warp*. Mr. Lieberman's newest venture, *Time Warp*, focuses on the use of high speed photography to show viewers new things about the world. Lieberman takes regular events or actions, such as a cat licking its paw or a champagne bottle being opened, and slows them down enough so the human brain can process exactly what is happening. These wonders are both beautiful and scientific, an intermingling of genres that Lieberman has perfected. Mr. Lieberman's presentation "Time Warping Science!" is from 7:00 – 8:45 p.m. in Lyte Auditorium. This promises to be a very exciting and entertaining event. The evening lecture is free and open to the public. Tickets are not required; just show up.



As always, it's going to be a busy year, but please take advantage of these opportunities and pay us a visit. Don't forget our physics seminars on Wednesday at 4:00 p.m. You are welcome to join us any time and there are always refreshments just before the presentations. We look forward to seeing you.

*Michael J. Nolan*

Michael J. Nolan, Ph.D.  
Chair and Professor of Physics

## **Alums! We want to brag about you!**

Please update your contact information online  
at: <http://www.millersville.edu/physics/>

Click on Alumni and then on Form to update your information;  
also click on Survey to tell us how well we served you while you were here.