

Spring 2015 Meeting of the Western Pennsylvania Section of the AAPT, 14 March, 2015
Grove City College, Grove City PA

Unless otherwise indicated, events are in STEM 051. No food is allowed in this auditorium, and drinks must have lids. Please finish your breakfast during the poster session time.

Agenda (may be modified at the discretion of the Executive Committee)

8:00-8:30 Registration, STEM lower level atrium

8:30-9:15 Student Poster Session and Breakfast, STEM lower level atrium

9:15-9:30 Welcome

9:30-10:30 Keynote Address by Sean Bentley, Director of Society of Physics Students: **Quantum Entanglement: The Future is Now**

Schrodinger and his cat. Einstein, God, and dice. Quantum mechanics evokes thoughts of the counterintuitive, yet has experimentally proven to be one of the most accurate theories in all of science. It is also central to the operation of modern electronics and optics that are ubiquitous in the 21st century. One of the strangest features of quantum mechanics is entanglement, which until recently was little more than an academic curiosity. However, with applications in computing, communications, imaging, cryptography, and more, quantum entanglement is finding its way from universities into corporations. We will discuss some key features of entanglement, why it can be useful, and how it may affect all of our lives in the near future. The focus will be on applications in optics, reflecting some cutting-edge aspects of the International Year of Light.

10:30-10:45 Willard, Kathleen (Monessen): **Rolling Out AP Physics**

In a smaller school district, the idea of offering AP Courses can be overwhelming. For years I looked at the AP Physics B Syllabus and said “There’s no way I could cover that in a year” When AP Physics B was split into two courses, I decided to take the plunge. I’ll be talking about my AP Summer Workshop experience and the challenges I’ve faced this year rolling it out. I’ll also answer questions that people may have to the best of my ability.

10:45-11:00 Reiland, Robert and Skinner, Mark (Shady Side): **Warming Up to Energy**

Mark Skinner and I wanted to have a piece of equipment that students could use to demonstrate the transfer of gravitational energy or kinetic energy into thermal energy. There one had been something like what we had in mind on the market, but since it used lead shot, it is no longer available. Mark and I decided to build something similar out of PVC pipe and to use iron filings instead of lead. Once we got the materials, the assembly and testing only took 5 minutes. The assembly and use of this system will be demonstrated.

11:00-11:15 Torigoe, Eugene (Thiel): **Randomly Calling on Students**

I have experimented with various methods to encourage class participation. In the past I’ve marked down every time a student participated, and gave them credit for participating. This was time consuming, and still there were

only a few students who did most of the participation. I've recently been experimenting with calling on students randomly in class. I call on students to answer questions, but I will help them through the solution if they don't know or are unsure. I'm interested in hearing your thoughts and experiences with calling on students.

11:15-12:30 Lunch in Hicks Dining Hall. Cost is \$7, and they only take cash.

12:30-12:45 Aravind, Vasudeva (Clarion): **Physics by Inquiry**

A lot of research has been done and is being done on how to teach physics to students of physics. In this talk, we will explore a possible approach to teach physics to freshmen who are not physics majors. Freshmen Inquiry Seminars are gaining popularity in many other disciplines. We will explore inquiry seminar in physics as a possible means to encourage critical thinking and logical problem solving to freshmen from various disciplines.

12:45-1:00 Davison, Candace (PSU RSEC): **Nuclear Science at the Penn State Radiation Science & Engineering Center**

The Radiation Science and Engineering Center (RSEC) was established to manage Penn State's comprehensive nuclear research facilities, including the Breazeale Nuclear Reactor, Gamma Irradiation Facility and Radioactive sources and Radiation measurement resources. The Center's resources are also available to users from other universities and educational institutions, governmental agencies, and corporations. Learn how neutrons and gamma rays are used in a variety of research applications such as neutron imaging, fast neutrons for space applications, isotope productions, etc. Educational experiences and resources related to nuclear technology topics for college and precollege level faculty and students will be discussed.

1:00-1:15 Bradshaw, John and Sobolewski, Stan (IUP): **Professional Science Master's (PSM) Program at IUP**

The Professional Science Master's (PSM) degree is a new graduate degree in physics that is offered at IUP. The PSM degree has many similarities to but also several notable differences from the regular Master's degree. 30 graduate credits are required. However, 6 to 9 credits are for professional development. These courses are taken at the graduate level in the business college. Also, an academic or industrial internship is required rather than a Master's thesis. We will present an overview of the program and highlight the experiences of several recent students and graduates

1:15-1:30 Marsch, Glenn (Grove City), and Guengerich, F. Peter (Vanderbilt): **Fluorescence Spectroscopic Analysis of Ligand Binding to Cytochrome P450 3A4: A Continuing Project Involving Undergraduate Students**

Human cytochrome P450 (P450) 3A4 is an enzyme involved in the metabolism of one-half of marketed drugs and is of interest because of its cooperative interactions with many ligands. Fluorescence spectra of P450 3A4 were acquired in the presence and absence of fluorescence quenchers. One of the quenchers is a compound that models drug-enzyme interactions. Based on these quenching studies, biophysical models of drug binding were developed that give insight into the complex interaction of P450 3A4 with its ligands. The role of undergraduate students in performing this research will be highlighted in this talk.

1:30-1:45 Wehner, Lilian (Wilson Christian Academy): **Learning to Learn**

In this talk, I will discuss the various ways the brain learns, and give suggestions on how to implement them both on the teacher end and the student end of the learning process. Although the applications will focus more on Physics, the methods can be adapted and/or modified for other subjects.

1:45-2:00 Walter, Autumn; Kuhnheim, Catherine; Taylor, Christopher; Jones, Dyan (Mercyhurst): **An overview of low dose radiation in conjunction with kinase inhibitors and the effects on cancer cells**

One of the primary methods available for treating cancer is radiation therapy. However, radiation therapy tends to cause adverse effects on healthy tissues, and thus, limits the use of this treatment. In order to minimize these side effects, radiation therapy can be used in combination with a chemical agent that acts as an inhibitor to increase the cancer cells' sensitivity to radiation in terms of the erbB signaling pathway, which renders the cancer cells more susceptible to the radiation damage. This talk will describe the radiation physics and biochemical principles that explain these effects, and also discuss how low-dose radiation in conjunction with chemotherapy drugs may introduce resistance to programmed cell death.

2:00-2:15 Business Meeting

2:15-2:30 Break

2:30-4:15 Parallel Workshops Please pre-register if possible, by emailing djwagner@gcc.edu.

"From College to Career," Career Workshop for students and their mentors, by Sean Bentley, Director of the Society of Physics Students (Rockwell 220)

Approximately half of all physics majors go directly into the workforce after receiving their bachelor's degree. What jobs are they prepared for? If you've heard the answer "physics majors can do anything" and thought that while it may be true it isn't very helpful for students seeking employment, then this workshop is for you. You will be introduced to the Careers Toolbox, a valuable resource for undergraduate physics students firmly based in research. Several of the tools will be discussed, with focused exercises on translating the experiences of the student into useful resume information to be performed during the workshop. Students will participate in the toolbox activities, and mentors will be trained in helping their students use the toolbox. Attendees are encouraged to pre-register by emailing djwagner@gcc.edu and indicating whether you are a student or a mentor, to ensure adequate resources are available. But walk-ins are welcome too.

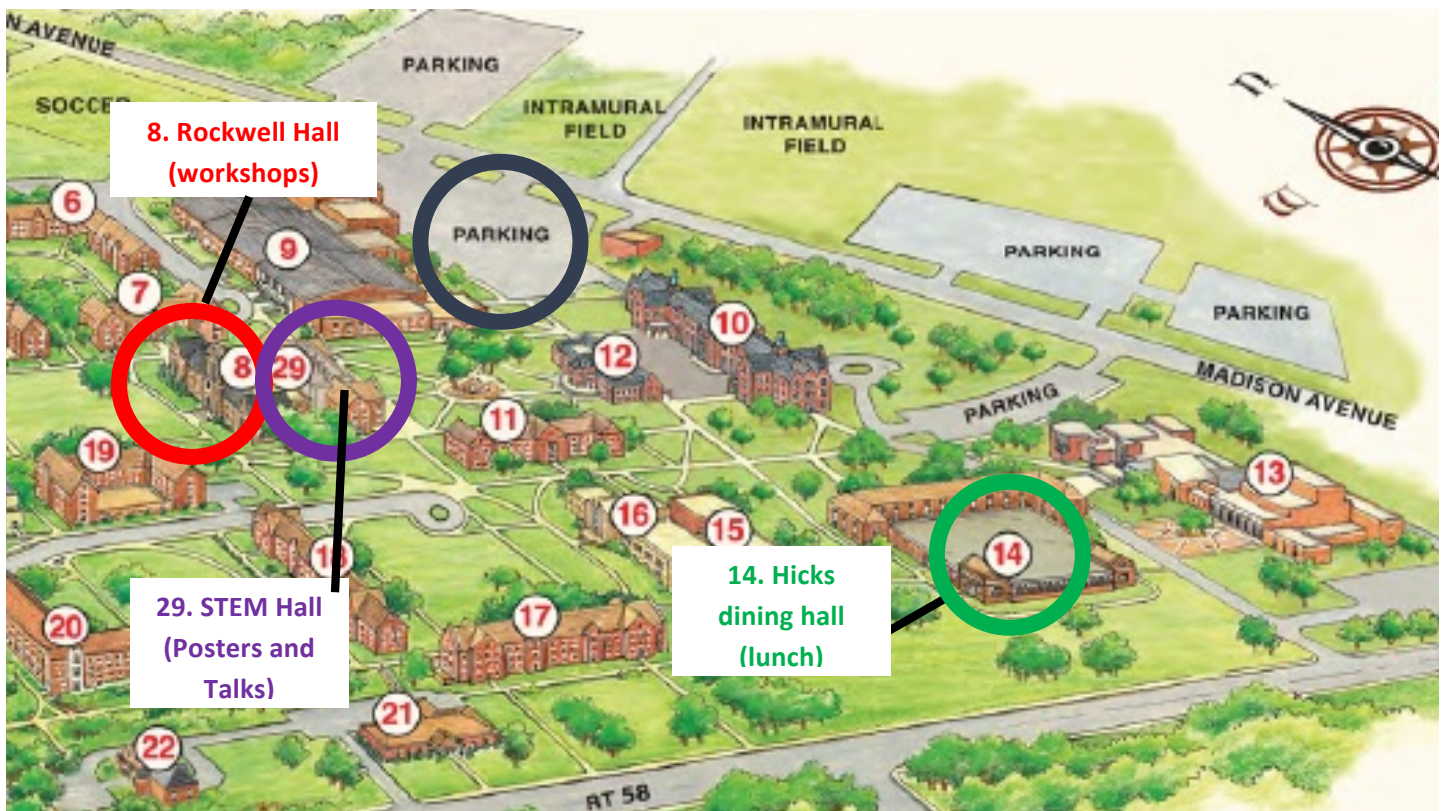
"Best Practices in Teaching about Light," Idea-Sharing Workshop facilitated by Bill Bradley (Rockwell 216)

Last spring, a request was made for sessions that allowed instructors to share ideas for teaching particular topics. In honor of the International Year of Light, this workshop will focus on effective teaching methods involving light. Participants are encouraged (but not required) to bring a demonstration, activity, exercise, and/or experiment that has proven effective in or out of the classroom. If possible, please provide a brief (no more than one page) summary of the activity, equipment needed, and learning goals, along with your contact information for those who want more information. Turn in this page at registration, and we will make (black-and-white) copies to be distributed at the workshop. We hope the workshop will draw a mix of folk with ideas to share and folk just looking for ideas to use in their classroom. Attendees are encouraged to pre-register by emailing djwagner@gcc.edu, to ensure adequate resources are available. But walk-ins are welcome too.

Have a Safe Drive Home!

Directions to Grove City College from I-79

- Take exit 113 off of I-79.
- Turn onto PA-208 E/PA-258 S (away from Outlets, toward Grove City).
- After 3.9 miles, you will reach one-way oncoming traffic (and a McDonald's)
- Turn right on W Main Street (Rt 58).
- Drive past the college on your left until you reach a blinking light at the top of the hill.
- Turn left onto Madison Avenue.
- Turn left into parking lot behind gymnasium (see map). Park in the Employee spots close to the gym.
- Walk around the gym to STEM hall, the new science building with lots of windows. Registration, poster session, and talks are in lower level.
- (For handicapped parking instructions, email djwagner@gcc.edu.)



Full campus map available at <http://www.gcc.edu/Documents/About/Campus%20Map.pdf>