

## Spring 2011 Meeting Announcement and Program Schedule

Grand Valley State University, Allendale, MI  
April 16, 2011

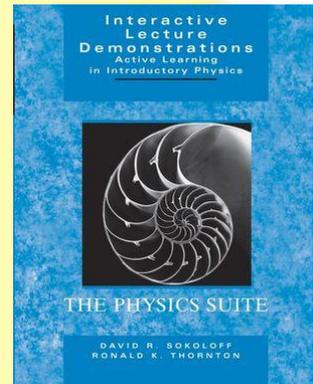
**New workshop added!**  
*Details on page 3*

### Program Highlights

We are honored to welcome David Sokoloff (U. of Oregon), President of the American Association of Physics Teachers, as our featured speaker. David is a nationally and internationally recognized leader and researcher in physics education. He has been awarded the 2007 AAPT Robert A. Millikan Award and the 2010 Excellence in Physics Education Award by the American Physical Society.



David will deliver the keynote address, entitled *Active Learning of Introductory Optics: Strategies for the U.S. and the Developing World*. He will present a 2-hour workshop for K-12 teachers and college faculty highlighting research-tested curricular materials he has co-authored with Priscilla Laws and Ron Thornton, *RealTime Physics* and *Interactive Lecture Demonstrations*.



We will also have a special contributed informational session by Michael Hartman, a faculty member in the Department of Nuclear Engineering and Radiological Sciences at the University of Michigan. He will discuss the physics of nuclear power plants and share insights into the ongoing crisis resulting from the earthquake and tsunami in Japan.

### Program Overview

Location: Sessions and workshops will take place in the Seymour & Esther Padnos Hall of Science on the GVSU Allendale campus. For campus maps and directions to the Allendale (main) campus of GVSU, visit their website at: <http://www.gvsu.edu/maps.htm>. (Padnos Hall is labeled building 55 and is located in region F-4 on the campus map found at the above URL.)

Registration: Registration cost is \$10 per meeting. Students and first-time attendees, though, may attend *free* of charge.

## Program Overview (cont.)

**Parking:** Parking is free on Saturday in all campus lots. The most convenient lot to use is Lot F, located along Campus Drive directly opposite Padnos Hall.

**Lunch:** Recommended dining options may be found in Commons (building 8), adjacent to Padnos Hall.

- Conferees may dine at the “Fresh Food Company,” a market-style all-you-can-eat restaurant located in the upper level of the Commons. Cost of lunch is \$8.75.
- Alternatively, the lower level of Commons features an upscale food court, “Fuel,” with Bleecker Street Café (a “Panera style” eatery), Jump Asian Express, and Papa John’s Pizza.

**Hotels:** For those who wish to stay overnight for the meeting, local hotel information can be found online at: <http://www.gvsu.edu/hotels.htm>. Recommended hotels include:

Sleep Inn & Suites, Allendale, MI: <http://www.sleepinn.com>, (616) 892-8000

Days Inn, Downtown Grand Rapids: <http://www.daysinn.com/DaysInn/control/home>,  
(616) 956-9304 or toll free at (800) 426-7866

Courtyard by Marriott, Downtown Grand Rapids: <http://www.marriott.com/hotels/travel/grrdt-courtyard-grand-rapids-downtown/>, (616) 242-6635 or toll free at (800) 321-2211.

## Program Schedule

- 7:30 – 8:10 am    **Registration/Morning refreshments**  
Padnos Hall/Henry Hall Atrium  
Meeting fee: \$10.00 (FREE for students and first-time attendees)
- 8:10 – 8:20 am    **Call to order and welcome**  
Loutit Lecture Hall 101 (adjacent to Padnos Hall/Henry Hall Atrium)  
Michael Faleski, Delta College – MIAAPT President  
Frederick J. Antczak – Dean, GVSU College of Liberal Arts and Sciences
- 8:20 – 9:20 am    **Contributed Presentations I**  
Loutit Lecture Hall 101 (adjacent to Padnos Hall/Henry Hall Atrium)
- 8:20 – 8:35        **Demonstrations of Ionized Radiation**  
Kevin Dehne, Delta College ([ktdehne@delta.edu](mailto:ktdehne@delta.edu))
- 8:35 – 8:50        **Teaching Nuclear Science Using Case Studies in Nuclear Forensics**  
Kathy Mirakovits, Portage Northern High School ([kmirakovits@portageps.org](mailto:kmirakovits@portageps.org))  
Drew Isola, Allegan High School  
Cathy Mader, Hope College
- 8:50 – 9:20        ***Special Contributed Presentation: An Overview of Nuclear Fission and Nuclear Power***  
Michael R. Hartman, University of Michigan ([mikehart@umich.edu](mailto:mikehart@umich.edu))

Prof. Hartman, Asst. Professor in the Department of Nuclear Engineering and Radiological Sciences at the University of Michigan, will discuss the basic physics of nuclear fission along with the theory and operation of a nuclear power plant. The talk will focus on developing a basis for understanding the recent events at the Fukushima Daiichi nuclear power plants in the aftermath of the magnitude 9.0 earthquake and subsequent tsunami.

9:20 – 9:30 am Break

9:30 – 11:30 am Workshops

*Workshop 1: Active Learning in Lecture Using Microcomputer-Based Tools*

107 Padnos Hall ← *Note change in room*

David Sokoloff, University of Oregon ([sokoloff@uoregon.edu](mailto:sokoloff@uoregon.edu))

Note: Max 24 participants. Please pre-register via e-mail at: [ambroseb@gvsu.edu](mailto:ambroseb@gvsu.edu).

The results of physics education research and the availability of microcomputer-based tools have led to the development of active learning materials to promote learning in the introductory Physics course. These include hands-on, student-oriented laboratory curricula like RealTime Physics (RTP), and lecture materials like Interactive Lecture Demonstrations (ILDs). One reason for the success of these materials is that they encourage students to take an active part in their learning. This mini-workshop will demonstrate—through active audience participation—materials designed to promote active learning in lab and lecture environments. An introduction to the evidence supporting the need for active learning strategies will be followed by participants working on examples of RTP activities. Four modules of RTP labs have been published by John Wiley and Sons: Mechanics, Heat and Thermodynamics, Electric Circuits and Light and Optics. Workshop activities will be taken from these. Participants will then work on examples of ILDs in a number of first and second semester topics. Results of studies on the effectiveness of these approaches in teaching physics concepts will also be presented.

*Workshop 2: Using Guided Inquiry to Improve Learning in Intermediate Mechanics*

106 Padnos Hall

Brad Ambrose, Grand Valley State University ([ambroseb@gvsu.edu](mailto:ambroseb@gvsu.edu))

Over thirty years of research in physics education has demonstrated that introductory courses delivered in a traditional lecture format (“teaching by telling”) do very little to develop conceptual understanding, problem solving skills, and scientific reasoning ability in students. More recent research has shown that even physics majors—who comprise a small percentage of students who take first-year physics—are not immune to the conceptual and reasoning difficulties identified among introductory students. In fact, many difficulties identified in the context of advanced physics classes seem to have their roots in basic concepts. This workshop will provide examples of how research has been used toward the development and refinement of guided-inquiry teaching methods in upper-level courses for majors.

*Workshop 3: Teaching Nuclear Science Using Hands-on Interactive Lessons in Nuclear Forensics*

142 Padnos Hall

Catherine Mader, Hope College ([mader@hope.edu](mailto:mader@hope.edu)) and

Kathy Mirakovits, Portage Northern High School ([KMirakovits@PortagePS.org](mailto:KMirakovits@PortagePS.org))



**NEW!**

This workshop will introduce K-12 teachers to a set of lessons that have been developed to teach nuclear science in the context of the real-world application of Nuclear Forensics. The lessons provide an exciting context in which to engage students in learning about the basic nuclear science content expectations. In addition to real-world scenarios that make learning the material relevant, the lessons also provide opportunities for students to be actively engaged in learning either through simulations or experiment. Participants will be introduced to the lessons briefly and will then work through several activities in nuclear chronometry that will introduce the ideas of radioactive decay, half-life and exponential decay. Simulations and hands-on experiments will be carried out and discussed. (*Note:* Participants who bring their own laptops will be able to download the simulations and other materials for use during the workshop!)

11:30 – 12:30 Lunch: Commons dining facility (*Fresh Food Company, Fuel*)

12:30 – 1:30 **Keynote Address: Active Learning of Introductory Optics: Strategies for the U.S. and the Developing World**  
David Sokoloff, University of Oregon  
Loutit Lecture Hall 101 (adjacent to Padnos Hall/Henry Hall Atrium)

Widespread physics education research has shown that most introductory physics students have difficulty learning essential optics concepts—even in the best of traditional courses—and that a well-designed active learning approach can remedy this. This presentation will describe strategies for promoting active involvement of students in the learning process. The focus will be on Interactive Lecture Demonstrations<sup>1,2</sup>, a learning strategy for large (and small) lectures, including the use of personal response systems (clickers), and on RealTime Physics laboratories. These materials have been used successfully by the author in his introductory college level physics course and in a recent series of Active Learning in Optics and Photonics (ALOP)<sup>3</sup> workshops in developing countries, sponsored by UNESCO, ICTP, SPIE, OSA, NSA and AAPT. Details on the ALOP project will also be presented, including a series of Optics Magic Tricks that are specially designed to promote active learning.

1. David R. Sokoloff and Ronald K. Thornton, Interactive Lecture Demonstrations (Hoboken, NJ, John Wiley and Sons, 2004).
2. David R. Sokoloff and Ronald K. Thornton, "Using Interactive Lecture Demonstrations to Create an Active Learning Environment," *The Physics Teacher* 35: 6, 340 (1997).
3. Active Learning in Optics and Photonics Training Manual, David R. Sokoloff, ed., (Paris, UNESCO, 2006).

1:30 – 2:00 pm **MIAAPT Business Meeting**  
Loutit Lecture Hall 101 (adjacent to Padnos Hall/Henry Hall Atrium)  
Michael Faleski, Delta College – MIAAPT President

2:00 – 3:45 pm **Contributed Presentations II**  
Loutit Lecture Hall 101 (adjacent to Padnos Hall/Henry Hall Atrium)

2:00 – 2:15 **Refraction without Trigonometry – Beaten to It by 400 Years!**  
David Schuster, Western Michigan University ([david.schuster@wmich.edu](mailto:david.schuster@wmich.edu))  
Betty Adams and Adriana Undreiu, Western Michigan University

2:15 – 2:30 **Discovering the Law of Refraction**  
Betty Adams, Western Michigan University ([b.adams@wmich.edu](mailto:b.adams@wmich.edu))  
Adriana Undreiu and David Schuster, Western Michigan University

2:30 – 2:45 **Observing and Visualizing Linear Momentum**  
Michael Faleski, Delta College ([michaelfaleski@delta.edu](mailto:michaelfaleski@delta.edu))

2:45 – 3:00 **Why Is It Cold at Night? Recording Radiational Cooling**  
Paul Zitzewitz, University of Michigan-Dearborn ([pwz@umich.edu](mailto:pwz@umich.edu))

3:00 – 3:15 **Mind-On Audio-Guided Activities in Introductory College Physics Courses**  
James Brian Hancock II, Central Michigan Univ. ([james.brian.hancock@gmail.com](mailto:james.brian.hancock@gmail.com))  
M. Fornari, Central Michigan University

3:15 – 3:30 **Tweetment of Twitter in the Classroom**  
JT Miller, Thornapple Kellogg High School ([jmiller@tkschools.org](mailto:jmiller@tkschools.org))

3:30 – 3:45 **The Problem with Industry Standard Textbooks**  
Philip Edward Kaldon, Western Michigan University ([philip.kaldon@wmich.edu](mailto:philip.kaldon@wmich.edu))

3:45 pm **Adjournment... See you at Omaha for the Summer 2011 AAPT meeting!**

## Abstracts for Contributed Presentations

8:20 – 8:35     **Demonstrations of Ionized Radiation**  
Kevin Dehne, Delta College (*ktdehne@delta.edu*)

The gamma ray part of the electromagnetic spectrum will be highlighted with examples and demonstrations. Using a Geiger counter, materials in our every day lives will be presented to illustrate gamma, alpha, & beta ionized radiation. A door prize will be given to a member of the audience!

8:35 – 8:50     **Teaching Nuclear Science Using Case Studies in Nuclear Forensics**  
Kathy Mirakovits, Portage Northern High School (*kmirakovits@portageps.org*)  
Drew Isola, Allegan High School  
Cathy Mader, Hope College

A project funded by an AIP Meggers Project Award, the goal is to give high school physics and chemistry teachers tools that aid in teaching nuclear topics. Using a nuclear forensics theme, high school teachers learn how to teach science standards in nuclear radiation, radioactive decay and detection. Teachers must complete a workshop on nuclear forensics where they learn to use the lessons and the equipment in a Nuclear Science kit provided by APS with funding from DHS. Teachers can then borrow the equipment on a rotating basis. Equipment includes Vernier radiation detectors and an easy to use cloud chamber.

8:50 – 9:20     ***Special Contributed Presentation:* An Overview of Nuclear Fission and Nuclear Power**  
Michael R. Hartman, University of Michigan (*mikehart@umich.edu*)

Prof. Hartman, Asst. Professor in the Department of Nuclear Engineering and Radiological Sciences at the University of Michigan, will discuss the basic physics of nuclear fission along with the theory and operation of a nuclear power plant. The talk will focus on developing a basis for understanding the recent events at the Fukushima Daiichi nuclear power plants in the aftermath of the magnitude 9.0 earthquake and subsequent tsunami.

2:00 – 2:15     **Refraction without Trigonometry – Beaten to It by 400 Years!**  
David Schuster, Western Michigan University (*david.schuster@wmich.edu*)  
Betty Adams and Adriana Undreiu, Western Michigan University

Seeking a law for refraction is potentially an ideal activity for inquiry-based physics. But the law involves sine functions, which seems to preclude it for students without trigonometry and complicates the search for a law; after all it took scientists at least a hundred years. Wanting a guided-discovery approach nonetheless, we ‘invented’ a geometrical representation: incident and refracted ray directions are specified not only by angle but by semi-chords in a reference circle. Students test various possible relationships and eventually arrive at a simple visually elegant law: the ratio of semi-chords for incident and refracted rays is constant. Descartes beat us to this by nearly 400 years! Students go on to use their law to solve refraction problems by constructing semi-chord diagrams.

2:15 – 2:30     **Discovering the Law of Refraction**  
Betty Adams, Western Michigan University (*b.adams@wmich.edu*)  
Adriana Undreiu and David Schuster, Western Michigan University

Refraction can serve as a wonderful example of a guided-discovery approach to a topic. Yet many ‘direct’ textbook treatments are the antithesis of this, despite the fact that physics is more than just a body of knowledge. Our scientific-inquiry approach involves exploring refraction behavior, tracing rays and testing for relationships between incident and refracted rays, toward discovering a law which works at all angles. A semi-chord representation for ray directions makes the task easier and has a counterpart in history. With or without lab, students can use ray-direction data to seek a law, as a valuable inductive discovery problem. We contrast our approach, epistemologically and pedagogically, with textbook presentations. Refraction proves to be an exemplary inquiry-based topic for prospective teachers, for learning both the physics and the nature of scientific inquiry.

2:30 – 2:45 Observing and Visualizing Linear Momentum  
Michael Faleski, Delta College (*michaelfaleski@delta.edu*)

Linear momentum is one of the concepts that students have the most difficulty understanding. Beyond applying a simple equation or a memorized result for specific scenarios, students seem to forget about using linear momentum and do not have a “feel” of what it is. This presentation will discuss some simple in-class questions to pose to students with quick activities that immediately demonstrate the results. In addition, discussion will include a possible way to look at linear momentum from a conceptual/visual point of view with extensions into ideas of energy.

2:45 – 3:00 Why Is It Cold at Night? Recording Radiational Cooling  
Paul Zitzewitz, University of Michigan-Dearborn (*pwz@umich.edu*)

In 1984 Dick Crane published a *The Physics Teacher* note showing a thermometer in an aluminium foil dish covered with plastic wrap that read  $-39^{\circ}\text{F}$  on a night when the temperature dropped only (!) to  $-11^{\circ}\text{F}$ . This study uses two temperature sensors, one in an aluminium foil dish, the other nearby, that are connected through a Vernier Sensor DAQ to a LabView program on a laptop. The dish does radiate its thermal energy to the 3K environment of outer space. The degree of cooling that Crane reported, however, has not been seen, most likely due to high humidity and thin cloud cover.

3:00 – 3:15 Mind-On Audio-Guided Activities in Introductory College Physics Courses  
James Brian Hancock II, Central Michigan Univ. (*james.brian.hancock@gmail.com*)  
M. Fornari, Central Michigan University

Minds-On Audio Guided Activities (MAGA) are Podcast-delivered instruction designed to facilitate learning through all-body experiments. Instruction by MAGA has undergone preliminary testing in an introductory physics course at Central Michigan University. Topics are currently focused on mechanics and range from discovering the differences between distance and displacement to momentum to the Coriolis effect. MAGA instruction emphasizes physical activity encouraging learners to engage their bodies and minds simultaneously. The session will include details of the approach and preliminary results.

3:15 – 3:30 Tweetment of Twitter in the Classroom  
JT Miller, Thornapple Kellogg High School (*jmiller@tkschools.org*)

How do I better connect with and appropriately communicate with my students? Twitter should be considered as part of the solution. This presentation is about unleashing the power of Twitter to better educate, inform and connect your students to your classroom and curriculum. This presentation will be focused on how Twitter is being used in a high school setting and strategies to make it successful.

3:30 – 3:45 The Problem with Industry Standard Textbooks  
Philip Edward Kaldon, Western Michigan University (*philip.kaldon@wmich.edu*)

The problems in this Internet world of having "industry standard" textbooks used by many, many institutions, is that problems, solutions, hints and even the publisher's solution manuals have leaked onto the web. Now we know that just copying over someone else's answers to a problem is wrought with dangers. Plus you're not helping your studying for exams. And you're cheating. And it's unfair to those who've slogged through a solution to be competing with cheaters. But recently a new problem has cropped up, adding to the baggage of “industry standard” textbooks.