Michigan Section of the American Association of Physics Teachers

2009 Spring Meeting
March 27 & 28, 2009
Biomedical and Physical Sciences Building
Michigan State University

Friday Workshops

12:00 – 5:00pm **AAPT/PTRA Waves Workshop for Newer Physics Teachers**
Al Gibson, Rochester Adams HS (retired)
Nicole Murawski, Royal Oak HS
Advance registration required http://www.miaapt.org/Spring2009MSTA_MIAAPT_PTRA_Workshop.pdf

7:00 – 9:00pm **Marble Nuclei Workshop**
Zach Constan, Outreach Coordinator NSCL

Participants will be introduced to a model of the atomic nucleus made from magnetic marbles. The workshop is intended to train teachers to use this model with a lesson plan and activities geared toward incorporating nuclear science/astrophysics in the middle or high school curriculum. These include:

- Introduction to the Chart of the Nuclides
- Radioactive Decay
- Nuclear Reactions
- A hands-on demonstration of nuclear fragmentation (NSCL's method of generating rare isotopes)
- A game that gives students practice reading the Chart of the Nuclides
- A game that simulates nucleosynthesis in a star

Advance registration required. Email: constan@nscl.msu.edu

Saturday Sessions

8:00 - 8:30 **Registration/Breakfast (BPS Atrium)**
Meeting fee $10
Order box lunch at registration $7.50

8:30 – 8:45 **Meeting call to order and opening comments (BPS 1410)**
Charles Henderson, MIAAPT President
Welcome by Michael Thoennessen, Associate Director NSCL

Morning Session I - Concurrent

8:45 – 10:45 **Astronomy Arm Workshops and Talks (BPS 1240)**
Workshop 1-Teaching Astronomy Online
Workshop 2-Online Astronomy Laboratory
Michael C. LoPresto, Steven R. Murrell, Henry Ford Community College

Oral Presentations:

Assessing the effectiveness of a comparative planetology activity
Michael C. LoPresto, Steven R. Murrell, HFCC

Determining the temperatures of planets using the Stefan-Boltzmann Law
Nicole Hagoort, Michael C. LoPresto, HFCC

Assessment of a solar-system walk
Brian Kirchner, Michael C. LoPresto, Steven R. Murrell, HFCC

Using the Stellar Properties Concept Inventory to compare instruction with lecture-tutorials to traditional lectures
Steven R. Murrell, Michael C. LoPresto, HFCC

8:45 – 10:45 **Oral Presentations** (arranged from submitted abstracts) **(BPS 1410)**

8:45-9:00 Teaching energy before work but after linear momentum
Michael Faleski, Delta College

9:00-9:15 Physics instructors' knowledge about and use of research-based instructional strategies: preliminary results from a national survey
Charles Henderson, Western Michigan University
Melissa Dancy, Johnson C. Smith University

9:15-9:30 Factors in determining physics majors
Donya Dobbins, Western Michigan University

9:30-9:45 Meet me on Facebook: social networking for supplemental office hours
Philip Edward Kaldon, Western Michigan University

9:45-10:00 Cars that can't crash – a collaboration project
Mark Davids, Grosse Pointe South HS

10:00-10:15 Do-it-yourself interactive whiteboard for under $75
Steve Dickie, Divine Child HS

10:15-10:30 Report from the AAPT Winter 2009 Meeting: conceptual electricity and magnetism problem database
Alan Grafe, University of Michigan – Flint

10:30-10:45 Other gems from the AAPT Winter 2009 Meeting
Paul Zitzewitz, University of Michigan – Dearborn

10:45 – 11:15 **Break**

Morning Session II: Invited Talk

11:15 – 12:15 **The ATLAS Experiment at CERN (BPS 1410)**
Bernard G. Pope, Professor of Physics, Department of Physics-Astronomy, MSU

I will describe the construction and physics prospects of the ATLAS detector that is due to start taking data later this year at the Large Hadron Collider (LHC) accelerator in CERN, Geneva, Switzerland. Particular emphasis will be placed on the pleasures and difficulties of working on a multi-thousand ton experiment, located multi-thousand miles away from East Lansing, and collaborating with multi-thousand colleagues from around the world. I will also briefly mention last September's accident that has delayed the LHC start-up by a year.

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Lunch

12:15 – 1:00 **Lunch**

Afternoon Session I

1:00 – 1:20 **MIAAPT Business Meeting & Elections (BPS 1410)**
Charles Henderson, MIAAPT President
Election of four-year college representative as 2nd VP
Section Officer's Report – Al Gibson

1:20 – 1:45 **Share-a-thon – Ideas for the Classroom (BPS 1410)**
Phil Kaldon – Diamonds in the Sky
Drew Isola & Donya Dobbins – PhET Simulations
Others as time permits

Afternoon Session II - Concurrent

2:00 – 3:30 **ComPADRE Workshop (BPS 1240)**
Presenter: Cathy Ezrailson, University of South Dakota
Editor, The Physics Front

This workshop will give participants a hands-on opportunity to try out the basic structure and features of ComPADRE including browsing, searching and creating a personal profile and filing cabinets ComPADRE supports teachers and learners in Physics and Astronomy by collecting and cataloging educational resources that are available online, and also by hosting other web-based services. It is organized as an umbrella over and a network connecting individual collections serving specific physics communities. ComPADRE is one of ten main pieces of the NSF's National Science Digital Library (NSDL: http://nsdl.org) The collections are free and open to all to browse.

2:00 – 3:30 **National Superconducting Cyclotron Laboratory Tour (BPS 1410)**
Zach Constan, Outreach Coordinator NSCL

Tour the National Superconducting Cyclotron Laboratory, located at MSU, (http://www.nscl.msu.edu/) one of the world's top nuclear research facilities. During the free 90-minute tour participants will:
- Learn how cyclotrons accelerate nuclei to half the speed of light
- See how researchers smash nuclei into a target to produce rare isotopes
- Meet scientists who are on the cutting edge of nuclear research
- Witness demonstrations of superconductivity, radioactivity, and cryogenics
- Get behind the scenes of a working nuclear physics laboratory the size of a football field

Afternoon Session III

3:30 – 5:00 **National Superconducting Cyclotron Laboratory Tour (repeat)**
Zach Constan, Outreach Coordinator NSCL

Parking available in the ramp on Shaw Lane.
http://www.miaapt.org/MIAAPT_Spring2009_directions.pdf

Abstracts

Morning Session I - Concurrent

Astronomy Arm Workshops and Talks (BPS 1240)

Workshop 1-Teaching Astronomy Online
Steve Murrell, Mike LoPresto, HFCC
A discussion of preparation and delivery of and problems encountered when teaching introductory astronomy online, also including existing useful resources.

Workshop 2-Online Astronomy Laboratory
Michael C. LoPresto, Steven R. Murrell, HFCC
A discussion of available resources and methods for and problems encountered when teaching an introductory astronomy laboratory course with online delivery

Assessing the effectiveness of a comparative planetology activity
Michael C. LoPresto, Steven R. Murrell, HFCC
Different groups of several students each are assigned to plot histograms comparing the values for different properties, mass, radius, density etc., of the solar system's eight planets and Pluto and transfer them to chalk/ white boards. Then, guided by a worksheet, students analyze the class's complete set of histograms and attempt to group planets into categories based on similarities and differences in the data. Results of the activity itself and group discussion questions based on it will be reported as well as pre- and post-testing results compared to sections that have not done the activity but received lectures on the topic.

Determining the temperatures of planets using the Stefan-Boltzmann Law
Nicole Hagoort, Michael C. LoPresto, HFCC
The Stefan-Boltzmann law can be used to derive an equation that provides a reasonable estimate of the temperature of any planet in orbit of the Sun. Real planetary temperature data from various sources can also be graphed and fit to high accuracy to the same equation that will give back a reasonable estimate of the surface temperatures of the sun.

Assessment of a solar-system walk
Brian Kirchner, Michael C. LoPresto, Steven R. Murrell, HFCC
Assessment of the effectiveness of a guided walk through a solar system scale-model for instruction on the relative scales of sizes and distances in the solar system when compared to lectures on the same subject shows, that if at all possible, such an activity is indeed worthwhile.

Using the Stellar Properties Concept Inventory to compare instruction with lecture-tutorials to traditional lectures
Steven R. Murrell, Michael C. LoPresto, HFCC
The Stellar Properties Concept Inventory (SPCI) is among the first instruments made available to assess student gains in a major section or unit of a traditional introductory astronomy course. This is in contrast to instruments for an entire course, such as the Astronomy Diagnostic Test (ADT) or the Lunar Phases Concept Inventory (LPCI) that is for a single subject. The following is a report on the results of use of the SPCI as a pretest and posttest in a study attempting to compare the effectiveness of Lecture-Tutorials to traditional instructor-centered instruction in the "stars" section of a course.

Concurrent Oral Presentations (BPS 1410)

Teaching energy before work but after linear momentum
Michael Faleski, Delta College
In the standard textbook for college physics, the order of topics proceeds as kinematics, dynamics, work and energy, and then linear momentum. In the sections relating to work and energy, texts always start from work and move to energy. What if the order of topics is rearranged? What if linear momentum follows the material on Newton's Laws? When work and energy are finally encountered, what if energy was discussed before work? Observations, pitfalls, and successes of trying this approach for the past several years will be discussed based on its implementation in a trig-based college physics class.

Physics instructors' knowledge about and use of research-based instructional strategies: preliminary results from a national survey *Charles Henderson, Western Michigan University*
Melissa Dancy, Johnson C. Smith University
Although substantial time and money has gone into developing Research-Based Instructional Strategies (RBIS) in physics, little effort has gone into understanding the extent to which these products are used by physics instructors. This talk will present the preliminary results of a web-based survey of a national sample of college-level physics instructors. Survey participants were asked to rate their level of knowledge about and use of a selection of currently available RBIS that are appropriate for use in an introductory quantitative physics course.

Factors in determining physics majors
Donya Dobbin, Western Michigan University
In the last twenty years there has been a decline in the number of students who major in physics. Due to the fact that the number of jobs requiring physics majors has increased in this time causes this to be a major issue of science education. This study will focus on the common experiences and characteristics that physics majors have during their junior high and high school career. To accomplish this, the researcher will conduct email interviews with physics majors from ten different Michigan Universities and Colleges. This information will be gathered and sorted into common themes in general and for both genders. From this information suggestions for encouraging more students to major in physics will emerge.

Meet me on Facebook: social networking for supplemental office hours
Philip Edward Kaldon, Western Michigan University
Every semester it's the same battle to get students who need help to come to office hours. You can offer tons of office hours, provide students with your e-mail address and even a home phone number, but still I can usually predict that I'll get about six "regulars" every semester to come to office hours. This semester I am trying a closed Facebook group, "Dr. Phil's Physics Class On Facebook".

Cars that can't crash – a collaboration project
Mark Davids, Grosse Pointe South HS
The next generation of automobiles will be equipped with GPS and DSRC* chips to interconnect vehicles to share real-time information about the local traffic, weather, road conditions, distances and speeds of nearby vehicles, state of signal lights, etc. Our students are working with Dave Acton, the "father of OnStar", and international telematics companies to model a "proof of concept" for the next generation of Vehicle Infrastructure Integration (VII) systems.
* DSRC are the Direct Short Range Communications circuits that operate at 5.9 GHz . The FCC has allocated 75 MHz of bandwidth for these new IEEE 802.11p traffic safety applications

Do-it-yourself interactive whiteboard for under $75
Steve Dickie, Divine Child HS
Schools are paying thousands of dollars on SMART and Promethean boards. You can create your own for a fraction of the cost. Using a controller for Nintendo's Wii, readily available supplies and free software you can create your own interactive whiteboard without the price tag that normally comes with one. An additional bonus for physics teachers is that the Wiimote incorporates a three-axis accelerometer that can be used for labs or demonstrations.

Report from the AAPT Winter 2009 Meeting: conceptual electricity and magnetism problem database *Alan Grafe, University of Michigan – Flint*
At the Winter 2009 AAPT meeting, John C. Stewart of the University of Arkansas introduced a new tool for teaching and evaluating introductory electricity and magnetism classes. This tool is an online library of over 1000 multiple-choice conceptual problems that are suitable for use either as an assessment tool or for exam and clicker questions. The large size of the database is intended to resolve issues of test leakage and teaching to the test.

Other gems from the AAPT Winter 2009 Meeting
Paul Zitzewitz, University of Michigan – Dearborn
There were many interesting talks and posters presented at the national meeting in Chicago. I will review a selection that were of special interest to me. Members of the audience who were at the meeting will be asked to contribute their favorites.

Afternoon Session II - Workshop

A Snapshot of a ComPADRE Digital Library Collection: *The Physics Front*
Cathy Ezrailson, University of South Dakota, Editor, The Physics Front

Workshop Goals:
- Reviewing the basic structure and goals of ComPADRE
- Examining a model for features and resources in ComPADRE for teaching at the precollege level.
- Using search and browse.
- Creating a personal area using ComPADRE's tools.
- Viewing an overview of information services provided.

Workshop Agenda:
- Introduction and basic structure and features of ComPADRE.
- Browsing and Searching: Finding resources in the Collections.
- Login: Personal Profile, Filing Cabinet, Comments, and Submissions.
- Sharing Filing Cabinets.
- Recommended Resources: Physics Front Topical Units
- Other resources in and beyond ComPADRE.

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