



Michigan Section of the American
Association of Physics Teachers

Fall 2011 Meeting Announcement and Program Schedule

University of Michigan - Dearborn, Dearborn, MI
October 7 and 8, 2011

Program Highlights

We are honored to welcome Dr Kevin Lee as our featured speaker. He is currently leading a group of artists and programmers who are developing astronomy education materials including online labs, in-class think-pair-share questions, and assessment tools such as ranking tasks. Kevin is a member of the NSF-Funded CATS (Community of Astronomy Teaching Scholars) team centered at the University of Arizona.



Kevin will deliver the keynote address on Saturday morning. He will also present a 3-hour workshop later that day providing a hands-on experience with ClassAction, a computer based resource for peer instruction. Participants are encouraged to bring their laptops to this session. Copies of software and a flash plugin will be available at the meeting as well as on the MiAAPT web site prior to the meeting.

Door Prizes!!!

We have some great door prizes donated by various vendors including:

- Arbor Scientific: Super bottle rocket launcher
- VWR Education: Dual (red & green) laser pointer
- Pasco: Mini-projectile launcher
- Vernier: \$100 gift certificate

Program Overview

Location: The Friday workshop will take place in room S-1 at the newly renovated Henry Ford Community College Science Building. A campus map is attached. Other maps and directions to the campus can be accessed at: <http://www.hfcc.edu/contact/locations.asp>.

Saturday sessions and workshops will take place in the **Science Learning & Research Center** on the campus of the University of Michigan – Dearborn campus. A copy of the campus map can be found at the end of this document. For additional maps and directions to Dearborn, visit their website at: http://www.umd.umich.edu/maps_directions. (The Science Learning and Research Center is labeled as SLRC on campus maps.)

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

Parking: **Henry Ford Community College** - Attendees of the Friday evening workshop and the Saturday afternoon planetarium show should park in **Student Lot I**.

University of Michigan Dearborn - Parking is free on Saturday in all campus lots. The most convenient lot to use is **Lot A**, located adjacent to the Science Learning and Research Center. There is also a parking structure and Lot C located a short distance from the meeting location along Monteith Blvd.

Lunch: Conferees can pre-order a boxed lunch from Jimmy Johns for \$12. Orders must be received by 8am on Thursday October 6th. An order sheet is attached. It is also available at www.miaapt.org. Please make your selections and send them via email to: james.gell@pccsmail.net. For those not wishing to order a box lunch, there are a variety of restaurants in the area. However, there are no facilities open on campus on Saturday. You can pay for your box lunch when you register.

Hotels: For those who wish to stay overnight for the meeting, local hotel information can be found online at: http://www.umd.umich.edu/housing_area_hotels/.

Program Schedule – Friday October 7th

6:00 – 9:30 pm

Workshop: Active and Collaborative Learning in Introductory Astronomy
Michael C. LoPresto, Henry Ford Community College (lopresto@hfcc.edu)
Location: S-1 in the newly renovated HFCC Science Building

In keeping with the theme of this fall's meeting, longtime MiAAPT member, organizer of the Astronomy-arm, Michael C. LoPresto of HFCC will present a 3-hour Friday Night workshop on active and collaborative learning in introductory astronomy focusing on the use of Lecture Tutorials. LTs, as they are called, are a pedagogy in which students work in groups to complete short inquiry-based worksheets on single topics that are accompanied by short warm-up and debriefing lectures. Research has shown that students taught with LTs show greater conceptual gains than students that receive lectures on the same topics. Combining the use of LTs with other active pedagogies such as Think Pair Share and Clickers will also be covered. Materials for the workshop, including a copy of the leading manual of Astronomy Lecture tutorials will be provided at no cost to participants by workshop cosponsor, the NASA/JPL-Center for Astronomy Education (CAE), <http://astronomy101.jpl.nasa.gov/index.cfm>. Michael is the coordinator of the CAE-Great Lakes Regional Teaching Exchanges (GLRTA) and a CAE-Collaborating Astronomy Teaching Scholar (CATS) <http://astronomy101.jpl.nasa.gov/cats/collaborators/>

Program Schedule – Saturday October 8th

- 7:30 – 8:00 am Registration/Morning refreshments**
Meeting fee: \$10.00 (FREE for students and first-time attendees)
Location: Science Learning and Research Center Atrium
- 8:00 – 8:10 am Call to order and welcome**
Brad Ambrose, Grand Valley State University – MIAAPT President
Don Bord, University of Michigan – Dearborn – Chair, Department of Natural Science
Location: Science Learning and Research Center Auditorium
- 8:10 – 9:55 am Contributed Presentations I**
Location: Science Learning and Research Center Auditorium
- 8:10 – 8:25 **Celebrating 100- and 1000-year Physics Anniversaries Through Postal Stamps**
Paul W. Zitzewitz, University of Michigan – Dearborn (retired) (*pwz@umich.edu*)
- 8:25 – 8:40 **It's (Not) Rocket Science: Undergraduate Goldstein**
Alan Grafe, University of Michigan—Flint (*grafe@umich.edu*)
- 8:40 – 8:55 **A Life in the Universe Survey**
Jennifer Hubble-Zdanowski, Henry Ford Community College
Michael C. LoPresto, Henry Ford Community College (*lopresto@hfcc.edu*)
- 8:55 – 9:15 **Approximating Spectral Class From Relative Line Strength For Introductory Astronomy**
Ron Schlaack, Delta College (*ronaldschlaack@delta.edu*)
- 9:15 – 9:25 **What Forces Act on a Beach Ball?**
Patti Hughey, Lansing Community College (*hugheyp@mail.lcc.edu*)
- 9:25 – 9:40 **Fundamentals of College Astronomy – A New, Interactive Website**
Steven R. Murrell, Henry Ford Community College (*srmurrell@hfcc.edu*)
- 9: 40 – 9:55 **Influence of Fluids on Compressional to Shear Wave Conversion in Reservoir Rocks**
Kandiah Balachandran, B & M Geophysical Research Co., Inc. & Kalamazoo Valley Community College (*kbalachandra@kvcc.edu*)
- 9:55 – 10:10 am Break**

10:10 – 11:10 am Contributed Presentations II

Location: Science Learning and Research Center Auditorium

10:10 – 10:25 Not So Fast... Confusion May Not Be The Student's Fault!

Michael Faleski, Delta College (michaelfaleski@delta.edu)

10:25 – 10:40 Teaching the Formation of Large Scale Structure in Introductory Astronomy

Carrie Swift, University of Michigan - Dearborn (cmswift@umd.umich.edu)

10:40 – 10:55 A Case for Standards-Based Grading in the Physics Classroom

Don Pata, Grosse Pointe North High School (Don.Pata@gpschools.org)

10:55 – 11:10 A Perturbation Solution of the Mechanical Bidomain Model

Vanessa Punal, Oakland University (vmpunal@oakland.edu)

11:10 – 11:30 am Puzzlers!

Location: Science Learning and Research Center Auditorium

11:10 – 11:15 The Projection Systems Do This?

Michael Faleski, Delta College (michaelfaleski@delta.edu)

11:15 – 11:20 Centripetal Force Demonstrations and Student Understanding

Kathy Mirakovits, Portage Northern High School (KMirakovits@PortagePS.org)

11:30 – 12:30 pm Lunch

12:30 – 1:00 pm MIAAPT Business Meeting

Brad Ambrose, Grand Valley State University – MIAAPT President

Location: Science Learning and Research Center Auditorium

1:00 – 1:30 pm Door Prizes!

1:30 – 2:30pm Keynote Address:

The Evolution of Peer Instruction

Dr Kevin Lee, University of Nebraska-Lincoln (klee6@unl.edu)

Location: Science Learning and Research Center Auditorium

A recent study by the CATS group has focused on looking for correlations between student learning gains and classroom interactivity. This research has shown that classroom interactivity is a necessary, but not sufficient condition for high learning gains. The manner in which the interactivity is implemented is a major factor -- what we do as instructors does matter!

This presentation will survey our evolving understanding of peer instruction – the most widely adopted technique for engaging students in the classroom. What does educational research (and common sense) tell us about how peer instruction should be implemented and where do questions remain? What are good questions and how do we make them better? Where is including technology advantageous and where is it a hindrance? I will close with an overview of ClassAction – a cutting-edge computer database of peer instruction materials – that holds promise for extending the peer instruction paradigm.

2:30 –4:30 pm Workshops

Invited Workshop #1

ClassAction: Dynamic Visual Peer Instruction in Astronomy

Dr Kevin Lee, University of Nebraska-Lincoln (klee6@unl.edu)

Location: 1014 SLRC

This workshop will provide a hands-on experience with ClassAction – a computer-based collection of peer instruction questions and resources for providing feedback. There are two overarching design goals in ClassAction: flexibility (subsets of materials and can easily be selected and adapted to a suit an instructor's particular needs) and a strong emphasis on visuals (question prompts consist of animations, images, and structured diagrams). This workshop will train instructors on how to use ClassAction and show examples of 1) designing sequences of questions that build in complexity, 2) the use of follow-up questions to check student understanding, and 3) using simulations to provide feedback on questions.

All ClassAction materials are publicly available for live use or download at <http://astro.unl.edu>. We would like to thank the NSF for funding under Grant Nos. 0404988 and 0715517, a CCLI Phase III Grant for the Community of Astronomy Teaching Scholars (CATS) Program.

Workshop #2

DMAPT - Make and Take

Steve Dickie, Divine Child High School (falconphysics@gmail.com)

Location: 1022 SLRC

Members of the Detroit Metropolitan Area Physics Teachers will provide materials and instructions for building simple apparatus for use in your classroom. A small donation is requested to offset the costs of materials. We plan on constructing a number of devices including: CD spectrometer, which will go great with our Color Changing LED. My favorite circular motion demo, the Greek Waiter's tray. A Mystery Tube, I've used my when teaching quantum models. A device to launch a paper rocket with an initial velocity of about 35 m/s. And a few more things that you'll just have to show up to see!

4:45 pm

Adjournment of U of M Dearborn Sessions...See you at Ontario (California) for the Winter 2012 AAPT meeting!

“Bet on relativity”

“There are many reasons to think the [CERN neutrino] experiment reported is not correct, and no reasons to think it is right. Special relativity and Lorentz invariance are part of all relativistic field theories. If any prediction based on them is wrong, lots more predictions must be wrong, but the tests are extremely good. Some people will look for such tests, so there will be papers soon reporting them. One is that the neutrinos from supernova 1987a are known to have arrived at the same time as the photons from 1987a to about a part in a billion, about 10,000 times closer in time than they would have arrived if this result were correct for the neutrinos. The supernova ones were electron neutrinos mainly, while these are muon neutrinos, but they oscillate into each other so it is likely that result contradicts the reported one strongly. Bet on relativity.”

– Prof. Gordon Kane, University of Michigan, personal communication Michael LoPresto, Sept. 28. 2011.

Abstracts for Contributed Presentations

8:10 – 8:25 **Celebrating 100- and 1000-year Physics Anniversaries Through Postal Stamps**
Paul W. Zitzewitz, University of Michigan – Dearborn (retired) (*pwz@umich.edu*)

2011 is the one hundredth anniversary of Rutherford's nuclear model of the atom, Marie Curie's second Nobel Prize, and Heike Kamerlingh Onnes's discovery of superconductivity. It is also the one thousandth anniversary of the writing of Alhazen's Book of Optics. Postal stamps have been issued recognizing these significant anniversaries. Images of selected stamps will be displayed and the importance of the events discussed.

8:25 – 8:40 **It's (Not) Rocket Science: Undergraduate Goldstein**
Alan Grafe, University of Michigan—Flint (*grafe@umich.edu*)

An error in the rocket problem (Chapter 1, Exercise 13) in the third edition of Goldstein's graduate Classical Mechanics text is used as case study for the use of Mathematica in undergraduate Classical Mechanics courses. We will see that this computational tool allows for a much deeper exploration of the physics of the situation in a manner that is accessible to undergraduate students.

8:40 – 8:55 **A Life in the Universe Survey**
Jennifer Hubble-Zdanowski, Henry Ford Community College
Michael C. LoPresto, Henry Ford Community College (*lopresto@hfcc.edu*)

The Life in the Universe Survey is 12 questions based largely on the Drake Equation for determining how abundant life may be in our galaxy and the chances of contact. The survey was developed based on the estimates made, both prior to and after instruction, for the various factors in the Drake Equation by students taking an honors course on the subject of Life in the Universe. The survey was then administered to students of both the honors course and in introductory astronomy. This talk will focus on the results of comparing responses to the survey both prior to and after instruction on astronomy in general and the specific topic of Life in the Universe.

8:55 – 9:10 **Approximating Spectral Class From Relative Line Strength For Introductory Astronomy**
Ron Schlaack, Delta College (*ronaldschlaack@delta.edu*)

Students in beginning astronomy classes are introduced to the usefulness of stellar spectra in regard to determining the properties of stars. In this lesson, they use spectra from the SDSS database, roughly assess relative line strengths for several different elements / molecules and then compare this information to a graph of relative line strength vs. spectral class for the materials. Shading the corresponding area under the curve for each material yields overlapping regions. In a high percentage of examples, an overlap of the shading under three curves gives a good approximation of the spectral class.

9:10 – 9:25 **What Forces Act on a Beach Ball?**
Patti Hughey, Lansing Community College (*hugheyp@mail.lcc.edu*)

My students do a Vernier LoggerPro experiment, **Back and Forth Motion**. When analyzing the motion, I find that the acceleration due to gravity is always smaller than 9.8 (about 6.5) m/s^2 . I think that one would expect that if only air drag and gravity are acting then, the acceleration on the way up should be greater than 9.8 m/s^2 and on the way down it should be less than 9.8 m/s^2 . The balls are filled with air, so I would not expect much buoyancy. The result happens whether there is any spin or not. Educate me, what am I missing?

9:25 – 9:40 **Fundamentals of College Astronomy – A New, Interactive Website**

Steven R. Murrell, Henry Ford Community College (*srmurrell@hfcc.edu*)

This talk will introduce a brand new interactive astronomy education website titled ‘Fundamentals of College Astronomy’, which was developed to accompany a new astronomy textbook by the same name. The website was developed by Steven R. Murrell and the printed text was authored by Michael C. LoPresto, both of the Henry Ford Community College in Dearborn, Michigan.

The motivation for developing this site will be discussed and a brief tour of the site will be given to include example applets contained in the website. The website incorporates many of the applets developed by our keynote speaker, Dr. Kevin Lee (University of Nebraska – Lincoln).

9:40 – 9:55 **Influence of Fluids on Compressional to Shear Wave Conversion in Reservoir Rocks**

Kandiah Balachandran, B & M Geophysical Research Co., Inc. & Kalamazoo Valley Community College (*kbalachandra@kvcc.edu*)

Converted shear waves (P- to S-) are clearly seen at large offsets in conventional seismic reflection profiling using 3-component seismometers. However, at normal or near normal incidence it is unusual. One such observation where the horizontal component signal was more pronounced than the corresponding vertical component prompted this inquiry. Possible explanations are scattering and anisotropy. A different possibility considered here is the conversion due to lateral motion of fluids in the reservoirs. This lateral motion of fluids induces shearing forces on the rock matrix due to a combination of viscous drag and pressure differences.

Compressional waves were induced in a slab of aluminum bonded to a Berea sandstone block and reflected waves, both compressional and shear, were recorded for varying offsets. In the first run the rock was dry. In a repeat run the rock was wetted with water. In one of these experiments significant differences between the observed shear wave amplitude and that predicted by theory were observed.

Another experiment investigated the influence of fluids on the transmitted wave. In this experiment compressional and shear motion in two orthogonal directions were induced on one face of the core sample and for each set-up all three motions were recorded on the opposite face. The data suggests that the converted shear is enhanced by the presence of fluids, in this instance water.

This transmission experiment was repeated under better controlled conditions. In the last experiment oil was used and a very significant difference between the amplitudes was observed. One has to realize that this demonstration is made at MHz frequencies. However, the original field observation was made at seismic frequencies of ~ 20 Hz and hence it seems feasible and rewarding to investigate the relationship between converted shear wave amplitudes and reservoir fluids. This may be considered analogous to “bright spot” technology for detection of gas which is reportedly very successful in Trinidad and Tobago and I am sure elsewhere.

10:10 – 10:25 **Not So Fast... Confusion May Not Be The Student's Fault!**

Michael Faleski, Delta College (*michaelfaleski@delta.edu*)

Particularly for veteran instructors, the kinds of misunderstanding that occur in a typical physics class often can be predicted. As a result, we (instructors) develop techniques of answering the kinds of questions that arise, applying the logic every time. However, there are often good reasons why students come up with some of their “strange” conclusions. This talk will look at a few such questions that arise and some reasons as to why students have their ideas. Hopefully, this presentation will cause even the most experienced instructor to think for a moment before answering the next student question in class.

10:25 – 10:40 **Teaching the Formation of Large Scale Structure in Introductory Astronomy**

Carrie Swift, University of Michigan - Dearborn (cmswift@umd.umich.edu)

The use of Lecture Tutorials has been shown to improve student understanding and performance in undergraduate introductory astronomy courses (Prather, et al., 2004, Lopresto and Murrell, 2009¹). Since the publication of the first set of lecture tutorials developed by CAPER², other tutorials have been produced, designed to cover additional topics (Smay and Kortz, 2010³, Robinson, 2007⁴). However, there are still few tutorials available that pertain to topics in cosmology. Cosmological concepts are challenging for introductory astronomy students, and additional resources to address these topics would be welcome. A new lecture tutorial, developed to address the question ‘Why is the Universe filled with Large Scale Structure, given the isotropic nature of the Cosmic Microwave Background?’ has been developed. The first trial of the tutorial revealed student misconceptions about the nature of the early Universe, and the equation of state of an ideal gas.

10:40 – 10:55 **A Case for Standards-Based Grading in the Physics Classroom**

Don Pata, Grosse Pointe North High School (Don.Pata@gpschools.org)

How does a grade reflect student understanding? Standards-based grading not only reflects what students have accomplished, it also allows provides feedback on what concepts a student has mastered and what they need to work on to develop mastery.

10:55 – 11:10 **A Perturbation Solution of the Mechanical Bidomain Model**

Vanessa Punal, Oakland University (vmpunal@oakland.edu)

This research focuses on finding analytical solutions to the mechanical bidomain model of cardiac tissue - in particular, a perturbation expansion is used to analyze the equations, with the perturbation parameter being inversely proportional to the spring constant coupling the intracellular and extracellular spaces. The results indicate that the intracellular and extracellular pressures are not equal, and that the two spaces can move relative to each other. This calculation is complicated enough to illustrate the implications of the mechanical bidomain model, but is nevertheless simple enough to solve analytically (one application of the calculation is to the mechanical behavior of active cardiac tissue surrounding an ischemic region).

11:10 – 11:15 **The Projection Systems Do This?**

Michael Faleski, Delta College (michaelfaleski@delta.edu)

When walking in front of a projector system, something occurred that was surprising. The physics is clear, but what is unclear is why it occurred.

11:15 – 11:20 **Centripetal Force Demonstrations and Student Understanding**

Kathy Mirakovits, Portage Northern High School (KMirakovits@PortagePS.org)

Why does a demonstration of centripetal force using a tennis ball can and tennis balls puzzle our students?

Jimmy Johns Lunch Box Options:

Please complete and email to: james.gell@pccsmail.net by 8am, Thursday, October 6th, 2011 – This form is also available online at www.miaapt.org

If you have any special requests, please include them in your email

1. Choose a bread:

- 7-grain bread
- French bread

2. Choose a sandwich:

- #7 GOURMET SMOKED HAM CLUB** A full 1/4 pound of real applewood smoked ham, provolone cheese, lettuce, tomato, & real mayo.
- #8 BILLY CLUB®** Roast beef, ham, provolone, Dijon mustard, lettuce, tomato, & mayo.
- #9 ITALIAN NIGHT CLUB®** Real genoa salami, Italian capicola, smoked ham, and provolone cheese all topped with lettuce, tomato, onion, mayo, and our homemade Italian vinaigrette. (You hav'ta order hot peppers, just ask!)
- #10 HUNTER'S CLUB®** A full 1/4 pound of fresh sliced medium rare roast beef, provolone, lettuce, tomato, & mayo.
- #11 COUNTRY CLUB®** Fresh sliced turkey breast, applewood smoked ham, provolone, and tons of lettuce, tomato, and mayo! (A very traditional, yet always exceptional classic!)
- #12 BEACH CLUB®** Fresh baked turkey breast, provolone cheese, avocado spread, sliced cucumber, sprouts, lettuce, tomato, and mayo! (It's the real deal, and it ain't even California.)
- #13 GOURMET VEGGIE CLUB®** Double provolone, real avocado spread, sliced cucumber, alfalfa sprouts, lettuce, tomato, & mayo. (Try it on my 7-grain whole wheat bread. This veggie sandwich is world class!)
- #14 BOOTLEGGERS CLUB®** Roast beef, turkey breast, lettuce, tomato, & mayo. An American classic, certainly not invented by J.J. but definitely tweaked and fine-tuned to perfection.
- #15 CLUB TUNA®** The same as our #3 Totally Tuna except this one has a lot more. Homemade tuna salad, provolone, sprouts, cucumber, lettuce, & tomato.
- #16 CLUB LULU®** Fresh sliced turkey breast, bacon, lettuce, tomato, & mayo. (JJ's original turkey & bacon club)
- #17 ULTIMATE PORKER™** Real applewood smoked ham and bacon with lettuce, tomato & mayo, what could be better!

3. Choose a Drink:

- Coke
- Diet Coke
- Sprite
- Lemonade
- Iced Tea
- Water

4. Choose a Cookie:

- Chocolate Chunk Cookie
- Raisin Oatmeal Cookie

5. Choose a Chip:

- Regular Chips
- BBQ Jimmy Chips
- Jalapeño Chips
- Sea Salt & Vinegar Chips
- Thinny Chips