

2015 Spring Meeting - April 10-11, 2015 Michigan State University

Are you interested in physics, physics education, or science literacy? If so, *you* are invited to the Spring 2015 meeting of the Michigan Section of the American Association of Physics Teachers! Join colleagues from across the state to exchange innovative ideas in the teaching and learning of physics.

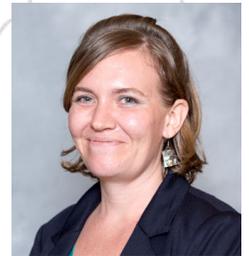
Starting out Friday Night with a public Talk by Brian O'Shea, Associate Professor of Physics, Michigan State University

Brian's research focuses on theoretical and numerical studies of galaxy formation and evolution, primarily using the Enzo adaptive mesh refinement code. He is particularly interested in the formation of the first stars, galactic chemical evolution, and the astrophysics of galaxy clusters. He is also interested in petascale computing, because many problems in astrophysics rely on numerical simulations to make theoretical progress. As the questions we ask become more difficult, so too must the calculations we undertake in our efforts to answer them.



Featured speaker: Vashti Sawtelle, Assistant Professor of Physics, Physics Education Research Lab, Michigan State University

Vashti Sawtelle is physics education researcher who studies how learning environments support (or inhibit) students from diverse backgrounds in their learning physics. She focuses her work on understanding the role active learning, modeling, and interdisciplinary classrooms (*e.g., physics for biologists*) have to play in creating supportive learning environments for all students.



Door Prizes!!!

We have some door prizes donated by Pearson, Vernier and others which will be distributed during the afternoon session, see the schedule below. You will want to be there for the drawing!

SCECHs

They have been applied for and should be available for high school teachers.

Program Overview

Location: The meeting will be held in the Biomedical and Physical Sciences (BPS) building on the campus of Michigan State University. See the map on the last page of the program.

Registration: Registration cost is \$10 per meeting. Students and first-time attendees, though, may attend *free* of charge. Refreshments will be available courtesy of the MSU Department of Physics and Astronomy.

Parking: Lots 41 and 46 after 6:00pm and on weekends without a permit

Lunch: Lunch will be provided courtesy of MSU Department of Physics and Astronomy.

Hotels: Information on area hotels, parking, and maps for MSU can be found at:
<http://www.msu.edu/visitors/index.html>.

Program Schedule

Public Talk: Friday, April 10 7:00pm-8:00pm, BPS 1415

Brian O'Shea

Disaster... From the skies!

Who hasn't had a day where they feel that the Universe was out to get them? Well, it turns out that it's true. In this talk, I will describe the myriad ways that the Universe is out to destroy the Earth (or, at the very least, every living thing on the Earth). This includes rogue black holes, supernovae, massive asteroids, and more! I'll explain what these objects are, how we are trying to detect them, and what if anything can be done if we DO detect one coming right for us. Bad science fiction movie-related jokes will abound.

Gather afterwards for discussion and refreshments

Program Schedule – Saturday, April 11th

8:00—8:30 am Registration/Morning Refreshments
Meeting fee: \$10.00 (FREE for students and first-time attendees)
Location: lobby BPS

8:30 – 8:45 am Call to Order and Welcome
Alan Grafe, University of Michigan-Flint – MIAAPT President
Danny Caballero—Assistant Professor of physics, MSU
Phil Duxbury—Professor & Chair physics, MSU
Location: 1400 BPS

8:45– 11:00 am Contributed Presentations

Location: 1400 BPS

8:45 – 9:00 **Enhancing Undergraduate Physics with Research**
Ayana Ghosh, University of Michigan-Flint (ayanag@umflint.edu)

9:00 – 9:15 **That's a nice trick... but is it "doing" physics?**
Michael Faleski, Delta College (michaelfaleski@delta.edu)

9:15 – 9:30 **Optics, A Modeling Approach**
Taoufik Nadji, Interlochen Arts Academy (nadjit@interlochen.org)

9:30 – 9:45 **Measuring Musical Consonance and Dissonance**
Michael C. LoPresto, Henry Ford Community College (lopresto@hfcc.edu)

9:45 – 10:00 am Break

10:00 – 10:15 **The Speed of Students**
Dr. Philip Edward Kaldon, Western Michigan University (philip.kaldon@wmich.edu)

10:15 – 10:30 **Student ideas around vector decomposition in the upper-division**
Anna Turnbull, Michigan State University (turnbu41@msu.edu)

10:30 – 10:45 **Monoid-mania**
Dr. Laurence Tarini, University of Michigan Flint (ltarini@umflint.edu)

10:45—11:00 **What can MSU nuclear science do for you?**
Zachary Constan, Michigan State University (constan@nsl.msui.edu)

11:00 – 12:30 pm National Superconducting Cyclotron Lab Tour

12:30 – 1:30 pm Lunch

1:30 – 2:30 pm Keynote Address: BPS 1400

Vashti Sawtelle

Why aren't there more women in science?

The underrepresentation of women in physics has been well documented and is a source of concern for both policy makers and educators. As a field, physics education has made progress in understanding the issues at play for women in physics courses. In this talk we'll discuss the current status of women in physics, what we know from research into the representation of women in physics, and guidelines for what we as instructors can be doing to create more equitable learning environments for all students.

2:30—3:30pm Posters, Puzzlers, High School Photo contest

3:30—4:00pm MIAAPT Business Meeting

4:00—6:00pm Contributed Workshops

Workshop #1

Doing Scientific Investigations in Introductory Astronomy-Is It possible?

Michael C. LoPresto, Henry Ford Community College (lopresto@hfcc.edu)

Location BPS 1400

One of the professed goals of many instructors of introductory astronomy is to expose general education students to science and "how science works," so students that are not majoring in science can go on to be better able evaluate what they will hear in the media about different scientific topics as citizens and voters. This goal could be achieved if students are required to do actual scientific investigations that require them to think scientifically in astronomy lectures and/or laboratories.

Long time MiAAPT member and former officer, Michael C. LoPresto, coordinator of the NASA/JPL-Center for Astronomy Education (CAE) Great Lakes Regional Teaching Exchange (which also serves as the MiAAPT-Astronomy Arm) invites you to an open discussion about ways to encourage and even require scientific thinking in introductory Astronomy. Please come prepared to report on ways you have been doing this in astronomy lectures and/or laboratories, share your results and comment on how successful you have been. A presentation on current attempts at this at Henry Ford College will be included if participants are interested and time permits.

Mike has been teaching introductory astronomy at HFC for 25 years now, has recently earned a PhD in Astronomy Education, is currently doing at Post Doc on the subject in the Astronomy Department at the University of Michigan and is a CAE -Collaborating Teaching Scholar.

Workshop #2

Make and Take

James Gell, Plymouth High School, (james.gell@pccsk12.com) and Steve Dickie Divine Child High School (falconphysics@gmail.com)

Location: BPS 1300

Topic: Participants will have the opportunity to construct apparatus that are usable for classroom demonstrations of physics phenomena by the teacher or which will serve as a model for constructing a classroom set for student use. These apparatus will be constructed of inexpensive and easily-attainable material available from hardware stores, building supplies, and online stores. Construction can be accomplished using common tools such as drills, saws, and fasteners.

Photo Contest: We will be holding a high school physics photograph contest, based on the AAPT photo contest that is held at the Summer Meeting. Teachers can develop their own rules for the contest to fit their students and situation, but we would like to encourage the top examples to be submitted to the AAPT contest. A prize will be awarded.

Abstracts for Contributed Presentations

Enhancing Undergraduate Physics with Research

Ayanna Ghosh, University of Michigan-Flint (ayanag@umflint.edu)

Performing hands-on research has always been proved to be a great tool to learn Physics in any level. This talk will address the importance of doing undergraduate research while learning various class topics. Moreover, there are several opportunities how one can find research opportunities across the countries including attending conferences which will also be discussed here. The presentation will conclude with sharing the presenter's own research experiences in different fields of physics as an undergraduate student at University of Michigan-Flint.

That's a nice trick... but is it "doing" physics?

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

By looking through any introductory textbook, it becomes clear that in order to be good at physics, one must also be good at algebra... lots of algebra! Are there other options? In this presentation, we take a look at some "standard" problems with "non-standard" solutions that can be applied to most textbook problems. Are these solutions somehow inferior and not really "doing" physics?

Optics, A Modeling Approach

Taufik Nadji, Interlochen Arts Academy (nadjit@interlochen.org)

Most Modeling Workshops around the nation have been focusing on Kinematics and Mechanics topics and a few have been devoted to Optics. The presenter will share his foray into the world of Modeling but through the lens of Optics, pun intended! :-)

Measuring Musical Consonance and Dissonance

Michael C. LoPresto, Henry Ford Community College (lopresto@hfcc.edu)

Combinations of musical tones are perceived by the human ear as either *consonant*, "pleasing" or *dissonant*, which is "not pleasing." Despite being largely subjective in nature, sensations of consonance and dissonance can be quantified and then compared to the judgments of human subjects. The talk and poster will be a description of several simple studies that can be carried out in the class- room of a physics of music or science of sound course augmented by the results of larger scale studies.

The Speed of Students

Philip Edward Kaldon, Western Michigan University (philip.kaldon@wmich.edu)

Sometimes it seems we are losing the battle with our students regarding the way the actual world works versus media presentations. This in turn might make for errors in perception and Putting The Physics Back Into The Problem (PTPBIP) when evaluating their answers to Physics problems. Visual examples given.

Student ideas around vector decomposition in the upper-division

Anna Turnbull, Michigan State University (turnbu41@msu.edu)

The Colorado Classical Mechanics/Math Methods Instrument (CCMI) is an open-ended assessment designed to investigate student skills in upper-division classical mechanics. One CCMI question targets vector decomposition in multiple coordinate systems. Through iterative and cooperative efforts to hand-code student responses, we identified common patterns in students' final expressions, resulting in broad categories. We also identified approaches to the problem inferred from features of student solutions. We observed that certain approaches more commonly resulted in particular errors. Here, we present results from our examination of 443 student responses.

Monoid-mania

Dr. Laurence Tarini, University of Michigan Flint (ltarini@umflint.edu)

Students often struggle to understand how resistors in series and parallel networks affect the total current in a circuit. A simple algebraic tool called a monoid helps to develop their intuition

What can MSU nuclear science do for you?

Zachary Constan, Michigan State University (constan@nsl.msu.edu)

National Superconducting Cyclotron Laboratory and Joint Institute for Nuclear Astrophysics - Center for the Evolution of Elements offer many outreach programs designed to help teachers and students incorporate more nuclear science in their learning. Demonstrations will include magnetic marble "nuclei" and a tablet-based rare isotope game, interleaved with explanations of camps and other opportunities

Abstracts for Contributed Posters

Tournament Approach to Peer Review in a Quantitative Course

Nicole Michelotti, University of Michigan (michelot@umich.edu)

Peer evaluation is widely used in writing intensive courses, where students exchange papers in class and use criteria to evaluate the writing of their fellow classmates. However, quantitative courses have not adopted this mode of teaching. While most assigned problems have one solution, for complicated problems posed in upper-level courses, some ways of approaching a problem are more sophisticated than others. It is conceivable that the same benefits seen in writing peer evaluation would translate to problem-solving assignments. Here, we describe how we implemented peer evaluation in an upper-level physics course and results.

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MIAAPT Mission Statement: The Michigan Section of the American Association of Physics Teachers is dedicated to promoting excellence in physics education in the state of Michigan and to supporting physics educators statewide. This organization shall endeavor to advance the knowledge of physics, to improve the teaching of physics, and to interest an increasing number of young people in making a career of physics.

The majority of meeting activities will be held in Biomedical and Physical Sciences (BPS, yellow star). Free parking is available after 6pm Friday and on Saturday in nearby surface lots (41 and 46, purple stars)

