



## Michigan Section of the American Association of Physics Teachers

# Fall 2018 Meeting Announcement and Program Schedule

**Interlochen Arts Academy, Interlochen, MI  
October 13th, 2018**

### Program Highlights

We are pleased to welcome Brian McNamara!

Brian McNamara is Professor and University Research Chair in Physics & Astronomy at the University of Waterloo, at Ontario, Canada. He serves as Chair of the Physics & Astronomy Department and was formerly director of the Guelph-Waterloo Physics Institute, which is the largest graduate program in physics & astronomy in Canada, and one of the largest in the world. He is an Affiliate of the Perimeter Institute for Theoretical Physics. After receiving a PhD at the University of Virginia in 1991, McNamara took a postdoctoral fellowship in the Netherlands at the Kapteyn Laboratory at Groningen. From 1993 to 2000 he was a staff member at the Chandra X-ray Center and Harvard-Smithsonian Center for Astrophysics. From 2000 to 2006, McNamara was a professor at Ohio University. Since 2006 he has taught physics and astronomy at the University of Waterloo, where he remains today.

McNamara studies galaxies and clusters of galaxies. He is interested in how they form and evolve under the influence of powerful radio jets launched by supermassive black holes. His most recent work involves making measurements with the earth-orbiting Chandra X-ray Observatory and the newly commissioned Atacama Large Millimeter Array, which is the most powerful telescope in existence. He served on the science team of the Hitomi X-ray observatory and currently on the XARM observatory, which is Hitomi's successor.

Brian will deliver the keynote address on Saturday entitled "Supermassive Black Holes: The Hearts of Galaxies"

## Program Overview

Location: Sessions and workshops will take place in the **Dow Rotunda** within the **R. B. Annis Math/Science Division** building. For campus maps and directions to the campus, please visit <http://www.interlochen.org/map>

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

Parking: Please refer to the map above for parking

Lunch: Lunch will be held in the IAA cafeteria. It will cost \$5 per person and will feature two hot lunch options, a deli counter, a salad bar, and special diet options.

Hotels: For those who wish to stay overnight for the meeting, local hotel information for both on- and off-campus lodging can be found online at <http://www.interlochen.org/lodging>

## Program Schedule

### **7:30 – 8:10 am Registration/Morning refreshments**

Dow Rotunda

Meeting fee: \$10.00 (FREE for students and first-time attendees)

### **8:10 – 8:20 am Call to order and welcome**

Dow Rotunda

Taufik Nadji, Interlochen Arts Academy – MIAAPT President

Dr. Mary Ellen Newport, Director of the R.B. Annis Math and Science Division

### **8:20 – 2:00 pm Contributed Presentations I**

Dow Rotunda

8:20 – 8:35 Learning Assistants as Constructors of Feedback: How Are They Impacted?

Paul C. Hamerski, Michigan State University

[tallpaul@msu.edu](mailto:tallpaul@msu.edu)

8:35 – 8:50 To Reflect or not to Reflect? Reflect, duh!

Taufik Nadji, Interlochen Arts Academy

[nadjit@interlochen.org](mailto:nadjit@interlochen.org)

8:50 – 9:05 Integrating Computation in Science Across the Mitten

Don Pata, Grosse Pointe North High School

[patad@gpschools.org](mailto:patad@gpschools.org)

9:05 – 9:20                    A New Look at the Drake Equation  
Michael C. LoPresto, University of Michigan  
lopresto@umich.edu

9:20 – 9:35                    Bringing Coding to High School Physics - Lessons Learned  
James Gell, Plymouth High School  
[james.gell@pccsk12.com](mailto:james.gell@pccsk12.com)

9:35 – 9:50                    Towards a Model of Instructional Change Teams: Participants' perspectives  
Diana Sachmpazidi, Western Michigan University  
ntiana.sachmpazidi@wmich.edu

**9:50 – 10:00 Break**

**10:00 – 11:00am    Keynote Address: Supermassive Black Holes: The Hearts of Galaxies**  
Brian McNamara, University of Waterloo  
mcnamara@uwaterloo.co

McNamara will discuss the evidence that black holes with masses exceeding a billion Solar masses exist at the centers of galaxies. He will discuss the emerging view that these so-called, supermassive black holes control the growth of galaxies.

**11:00 – 12:00 pm    Contributed Presentations II**

11:00 – 11:15                    Comparison of First-Generation and Non-First-Generation Students on  
Introductory Physics Exams  
Nita Kedharnath, University of Michigan  
[nitaked@umich.edu](mailto:nitaked@umich.edu)

11:15 – 11:30                    Writing-to-Learn Assignments in Introductory Physics  
Rob Dalka, University of Michigan  
rpdalka@umich.edu

11:30 – 12:00                    Feedback as a mechanism for improving students' communication skills  
Daryl McPadden, Michigan State University  
mcpadden@msu.edu

**12:00 – 1:00**                    **Lunch: Commons dining facility (*Fresh Food Company*)**

**1:00 – 1:30 pm**                **MIAAPT Business Meeting**  
Location Info  
President Name, Institution – MIAAPT President

**1:30 – 2:30**                    **Workshops**

1:30 – 2:30      Integrating Computation in Science Across the Mitten  
Don Pata, Grosse Pointe North High School  
patad@gpschools.org

There is currently a movement to integrate computation (coding and programming) into high school and college physics classes. Last summer I attended a workshop that trains high school teachers to do just that.

This workshop will show teachers how to integrate coding into an introductory physics class without the kids having to know how to code before. It will introduce participants to the tools and procedures and let everyone know how to get involved next summer.

**2:30 pm**                        **Adjournment**

## **Abstracts for Contributed Presentations**

8:20 – 8:35      Learning Assistants as Constructors of Feedback: How Are They Impacted?  
Paul C. Hamerski, Michigan State University  
tallpaul@msu.edu

Project and Practices in Physics (P-Cubed) is a flipped section of introductory, calculus-based physics, designed with a problem-based learning approach where students work in groups on complex physics problems. Learning Assistants (LAs) function as primary instructors in the course. One of their duties is to write individualized weekly feedback, meant to offer suggestions to the student for how to improve their in-class work. We conducted semi-structured interviews with LAs to examine the ways that they construct feedback and how this impacts their own experiences outside of P-Cubed. In this presentation, we examine and discuss the reflections of these LAs.

8:35 – 8:50      To Reflect or not to Reflect? Reflect, duh!  
Taoufik Nadji, Interlochen Arts Academy  
nadjit@interlochen.org

The presenter will share examples of students' reflections on their physics and astronomy readings and video-watching experiences. Since the reflections require that students tie their arts to physics and astronomy concepts they learn, the outcome is exceeding beauties in writing and the fusion of the arts and sciences.

8:50 – 9:05      Integrating Computation in Science Across the Mitten  
Don Pata, Grosse Pointe North High School  
patad@gpschools.org

Integration computation into my high school teaching practice has been a valuable addition to my pedagogy. This past summer I took a 5 day workshop to learn just how to do so. The students are excited and I love adding another representational tool to their understanding.

9:05 – 9:20      A New Look at the Drake Equation  
Michael C. LoPresto, University of Michigan  
lopresto@umich.edu

Recent research on extra solar planets has provided consensus for the factors;  $f_p$ , the fraction of stars with planets, and  $n_e$ , the number of habitable planets per system of the Drake Equation,  $N = N^* f_p n_e f_l f_i f_c$ , used to estimate the number of communicative civilizations in our galaxy. Taking these factors and  $N^*$ , the number of stars in our galaxy, as “know” can turn discussion to  $f_l$ ,  $f_i$ , and  $f_c$ ; the fraction of habitable planets on which life develops; on which life evolves to intelligence and develops communicative technology. Pessimistic estimates for the number of communicative civilizations in our galaxy,  $N$ , and the lifetime of a technological civilization can set an approximate value for the product of these factors around which a more directed discussion can be framed.

9:20 – 9:35      Bringing Coding to High School Physics - Lessons Learned  
James Gell, Plymouth High School  
[james.gell@pccsk12.com](mailto:james.gell@pccsk12.com)

Writing computer code can be very rewarding or it can be incredibly frustrating. Over the past year, high school physics students at Plymouth High School have been using computer code to build simulations using the Glowscript development environment that supports the Visual Python (vpython) programming language. This presentation is a reflection on the activities and strategies that led to positive outcomes for the students using vpython as well as those activities and strategies that were not successful. Changes in the implementation for the 2018-2019 school year will also be presented.

9:35 – 9:50      Towards a Model of Instructional Change Teams: Participants' perspectives  
Diana Sachmpazidi, Western Michigan University  
ntiana.sachmpazidi@wmich.edu

Team-based efforts to improve undergraduate STEM education have several advantages over instructors working alone. However, current literature on how these efforts can be effective is limited. In the first stage of our study, we developed an initial model of instructional change teams from interviews with 28 project leaders. In this talk, we describe how new information from team members was used to improve the model. We focus on particular elements of the model that appear to impact team outcomes, such as shared vision, team cohesion, and interpersonal team processes.

11:00 – 11:15 Comparison of First-Generation and Non-First-Generation Students on Introductory Physics Exams

Nita Kedharnath, University of Michigan  
[nitaked@umich.edu](mailto:nitaked@umich.edu)

Many students approach timed, high-stakes, multiple-choice exams with similar strategies. Read the questions carefully. Eliminate wrong answers. Minimize time spent on each problem. Check their work if they have time. How do these practices change for different students when time pressure is removed? Last semester we gave all 600+ students in an introductory physics course 50% more time on exams than previous terms. There were significant differences on time usage between first-generation and non-first-generation students, along with subsequent performance differences. We explore how their time usage and performance differed and provide strategies to address these differences.

11:15 – 11:30 Writing-to-Learn Assignments in Introductory Physics

Rob Dalka, University of Michigan  
[rpdalka@umich.edu](mailto:rpdalka@umich.edu)

Writing is shown to improve learning, including in the sciences. This Fall semester, Writing-to-Learn (WTL) assignments were introduced into the calculus based introduction to physics course at the University of Michigan for ~650 students. In this talk, I will explain the practical challenges of implementing this for a large class, along with the learning theories that motivated our decisions. I will describe the format our assignments took and how students responded and interacted with the assignments. I will also take an in depth look at a writing prompt that was used and explain the choices we made when creating it.

11:30 – 12:00 Feedback as a mechanism for improving students' communication skills

Daryl McPadden, Michigan State University  
[mcpadden@msu.edu](mailto:mcpadden@msu.edu)

Co-authors: Paul Hamerski, Marcos D. Caballero, and Paul Irving (Michigan State University)  
Communication is cited as an important scientific skill; however, there are few suggestions on how to actually support students in developing these skills in science. As a possible mechanism for helping students improve their communication skills, we present a scaffolded feedback system, which has been built into the reformed, introductory E&M course. From a case study, we demonstrate the impact of the weekly feedback system on changing and improving a student's communication in this course.