**Chesapeake Section of the AAPT Virtual Fall Meeting**
**Saturday, October 24, 2020**

The fall meeting for the Chesapeake Section of the American Association of Physics Teachers will take place virtually on Saturday, October 24. Join your colleagues via Zoom for a variety of contributed talks, a plenary talk on mathematics history, a workshop on integrating computation into physics courses, and an opportunity to socialize and grow your physics community.

There is no conference for this meeting! **The fall meeting will be completely free, but you do need to RSVP** using this Google form. The Zoom link will be distributed via email the week of the meeting to all registered participants.

Schedule at a Glance:

8:30 – 9:00 Log on and Socialize
9:00 – 10:15 Contributed Talks I
10:15 – 10:30 Break
10:30 – 11:30 Plenary Talk
11:30 – 1:00 Lunch and Socialize
1:00 – 2:00 Contributed Talks II
2:00 – 2:15 Break
2:15 – 3:15 Workshop
3:15 – 3:45 CSAAPT Business Meeting (all are welcome)

Contributed Talks I: 9:00 – 10:15 AM

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| 9:00 – 9:15<br><br>Tatsu Takeuchi<br><br>Virginia Tech<br><br>takeuchi@vt.edu | **Using Mathematica to create interactive physics apps**<br><br>*I will demonstrate how to use Mathematica to generate interactive physics apps that can be used in both in-class and remote physics lectures. Specific examples include apps for geometrical optics, showing the relation between uniform circular motion and simple harmonic motion, and sound phenomena.* |
| 9:15 – 9:30<br><br>Carl E. Mungan<br><br>United States Naval Academy<br><br>mungan@usna.edu | **A bead sliding on a rotating rod with elastic and frictional forces**<br><br>*A bead slides along a rod rotating at constant angular speed about an axis perpendicular to its midpoint. The setup is in space so there is no gravity. An ideal spring pulls the bead toward the axis of rotation. In addition, there is kinetic friction between the bead and rod. What are the possible motions of the bead, if it starts at the axis and is given a radially outward push, for different angular speeds of the rod?* |

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| 9:30 – 9:45<br><br>Rebecca Rosenblatt<br><br>AAAS/NSF<br><br>rosenblatt.rebecca@gmail.com | **Investigating research themes and funding for the Physics Education Research community**<br><br>*Patterns of funding sources for the PER community over the last ten years and a preliminary analysis of research themes will be presented. These investigations involve text-based analysis of all contributed Physics Education Research Conference (PERC) proceedings between 2010 to 2019. PERC proceedings were selected given the central role of PERC to the PER community. PERC proceedings represent the community across scope of projects from small to large, across stage of projects from beginning to finished, and across investigator experience from new to established researchers. The goal of this work is to provide insight into the community's history and trajectory of funding mechanisms and research methodologies and areas.* |
| 9:45 – 10:00<br><br>David Morgan<br><br>Richard Bland College of William and Mary<br><br>dmorgan@rbc.edu | **Virtual labs as an opportunity to introduce students to programming**<br><br>*In this talk, I will present an activity designed to introduce beginning physics students to the syntax and logic of Python programming by having them take a peek "under the hood" of simulations designed to explore projectile and orbital motion as a virtual lab activity.* |
| 10:00 – 10:15<br><br>Nate Harshman<br><br>American University<br><br>harshman@american.edu | **Dynamics of digits: Calculating Pi with Galperin billiards**<br><br>*In Galperin billiards, two balls colliding with a hard wall form an analog calculator for the digits of the number π. This classical, one-dimensional three-body system (counting the hard wall) calculates the digits of π in a base determined by the ratio of the masses of the two particles. This talk reviews previous results for Galperin billiards (mostly due to mathematicians) and recasts them in the language of physics and classical dynamics. In particular, we show that dynamical invariants for any mass ratio provide integrability for the system, and for a sequence of specific mass ratios we identify a third dynamical invariant that establishes superintegrability. Integrability allows us to derive some new exact results for trajectories and to map the Galerpin billiards onto a two-particle Calogero-type model.* |

Plenary Talk: 10:30 – 11:30 AM

**Everyone Makes Errors: A 19th-Century Mathematical Attempt to Prove the Existence of God**
Adrian Rice, Randolph-Macon College

*Augustus De Morgan (1806-1871) is best remembered today for his work in symbolic logic and algebra, which resulted in the creation of 'De Morgan's Laws'. Less well known is his work on probability and, more specifically, the use of probabilistic ideas and methods in his logic. De Morgan was one of the first mathematicians to understand and appreciate the work of the French applied mathematician Pierre-Simon Laplace, who wrote groundbreaking (but incomprehensible) treatises on both probability and celestial mechanics. Under his influence, and using his astronomical data, De Morgan attempted to use probabilistic reasoning to answer one of the most profound and tantalizing questions of all time: whether or not a divine creator exists or ever existed. This talk gives the mathematical and historical details of his ill-fated attempt to mathematically prove, or at least determine, the existence of a deity.*

Lunch and Socialize: 11:30 – 1:00 PM
You can stay online and socialize while you eat, or you can take a break from screen time and re-energize on your own before returning for the afternoon sessions.

Contributed Talks II: 1:00 – 2:00 PM

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| 1:00 – 1:15<br><br>Lewis McIntyre<br><br>mcintyrel@verizon.net | **The Brehme Angle and the velocity triangle**<br><br>*The Brehme Angle, equal to arcsin (v/c), allows the Lorentz Transform to be expressed trigonometrically. This paper presents the velocity triangle derived from that expression that allows two reference frames to be expressed with orthogonality and of equal units of measure. The velocity triangle reveals the Lorentz transform to be a vector projection of an event in one reference frame to a measurement of time and velocity in another reference frame. This paper presents a graphical solution for an event of proper time only, and the transformation of a measurement ct, x to a measurement ct*, x*. This so radically simplifies the Lorentz transform that the entire Special Theory of Relativity could be easily and clearly taught at the high school level.* |

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| 1:15 – 1:30<br><br>David Wright<br><br>Tidewater Community College<br><br>dwright@tcc.edu | **Remote instruction**<br><br>*Just because many of us are teaching remotely, doesn't mean that Physics must now be boring. It's indeed possible to do many of demos that you were doing are doing in the classroom by Zoom, or other means of remote broadcasting. In this presentation, I will perform a number of different demos in a similar fashion to the way that I did them in my remote Spring class. I will also include a segment taken from a remote interview on the Kelly Clarkson Show. Following the conference, a list of demos and YouTube videos that I have compiled over the years will be posted on the CSAAPT website. These demos require readily available or inexpensive objects, and most of them are applicable for remote instruction.* |
| 1:30 – 1:45<br><br>Eric Bubar<br><br>Marymount University<br><br>ebubar@marymount.edu | **RPG physics games in the classroom during covid**<br><br>*In 2014 I presented that "Science is a Game". In this presentation I discussed using short games in the classroom based on "Reacting to the Past" - a pedagogy where students roleplay historical events in elaborate games. Over the past 6 years I have adapted and tweaked games to develop a scaffolded approach to have students teach themselves about science/media ethics, science history, science as solutions for society and science in conflict. Through four short games (playable in the span of a single lecture sessions) students will send astronauts to Mars, place Galileo on trial against the Pope, develop plans for solutions to climate change and have a scientific fight where both sides have solid evidence for their conflicting views. In light of the global pandemic I have adapted these games into a cohesive google site with pre-and-post game assessments built into google forms. Students have successfully played two of the four games over Zoom and I will share lessons learned as well as clips of gameplay to demonstrate how this pedagogy works as an engaging tool for students to communicate and collaborate.* |

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| 1:45 – 2:00<br><br>Rhett Herman<br><br>Radford University<br><br>rherman@radford.edu | **Examples of project based learning in physics**<br><br>*Project Based Learning (PBL) has been shown to increase student learning by giving students an active role in their curriculum, and by providing them with an experience that goes beyond the traditional lecture- and cookbook-lab-based academic setting. PBL has also been shown to increase the academic success of women, students of color, and low-income students. Denofrio et al. (2007) found that students are more motivated to learn fundamental skills of experimental design and experimentation when the context of their work is personally relevant. This talk will focus on several examples of PBL in upper level physics classes. The criteria for choosing a successful project will be discussed, and examples of introductory materials (to the students) as well as grading rubrics will be presented.* |

Workshop: 2:15 – 3:15 PM

**Getting Started with JupyterLab**
Rachele Dominguez, Randolph-Macon College

*We will walk through an Anaconda Installation of JupyterLab (for Mac or Windows). Then we will work through a JupyterLab tutorial that will introduce the basics of the python language, the Markdown language, and the use of LaTeX for equations. We will cover some skills, like curve fitting, that are commonly used in Physics Labs. There will be lots of resources linked in the tutorial to help get you started using JupyterLab in the classroom. All levels are welcome: no prior programming experience required.*

CSAAPT Business Meeting: 3:15 – 3:45 PM
Members and non-members are welcome at the business meeting. We will discuss ideas for upcoming CSAAPT meetings and activities, Deonna Woolard, our section representative, will provide an update on National AAPT activities, and we will hold elections for the next term of CSAAPT Executive Board positions.

**Don't forget to RSVP.** Complete this form before the conference in order to receive the Zoom link for the meeting.

**Instructions for presenters wishing to pre-record your presentation**

All the talks will be presented at their scheduled times on October 24. If you wish to pre-record your talk for convenience or to ensure all your technology works, you may do so, and we can play a recording of your presentation during your scheduled time. Please limit your recording to 12 minutes so that you have a few minutes remaining during your scheduled time on the 24th for questions.

You may record your presentation using any tool you find convenient (Zoom, recorded PowerPoint, Screencast-o-Matic, etc.). Once recorded, upload your video to YouTube and send an email to Alex Barr at abarr@howardcc.edu with the title and link to your video.

Uploading to YouTube:

1. Sign into YouTube
2. Click the Create video camera icon in the upper right and select Upload video
3. Follow the instructions and select either Unlisted or Public for the Visibility setting
4. View your video to check both the audio and video
5. Email the YouTube link to abarr@howardcc.edu