9:00 Morning Workshop: Hands-on Physics Labs for New Teachers

James Lincoln, Bill Layton, Jennifer Scholz

In this workshop participants get to perform several hands-on experiments and receive equipment to take back to their classes. Together we investigate thermodynamics, electromagnetism, non-ohmic circuits, and the photoelectric effect. All the labs we do, you get to keep!

10:00 Welcome, SCAAPT President James Lincoln

10:05 Teaching Circuits and the NGSS

Joseph Calmer, Beckman HS

The NGSS has many explicit standard requirements for the performance expectations (PE) and the scope of a course; specifically a physics course. The PE is a novel frame to build student learning upon. Physics has shifted from discrete lessons to learning sequences. The goal of the learning sequence has the intention of building student coherence of physics fundamentals and phenomena. Moreover, despite the abundance of explicit physics topics in the NGSS framework, circuits are implicitly present in various PEs contained within schools' learning sequences. For example: the orange DCI strand box, that supports the PE, makes reference to items and materials that are tacitly understood to be circuits. Circuits are in the NGSS, but may not be a direct Performance Expectation for Physics students. Circuits are a pedagogical mechanism to help students learn about their world, society's technological achievements, and material behavior in the presence of a field. Circuits are a way for students build their mental models of understanding and construct coherent view of the world that they live in.

10:25 Building Literacy Skills Using Physics Performance Tasks

Jefnnifer Caamano Scholz

Literacy, in both language and math, has always been a problem that has plagued physics professors. To both access and demonstrate mastery of physics content, students must have a grasp of math, reading, and writing skills. Student drop, failure, and withdrawal rates across science and engineering courses, particularly for low-income first-generation students of color, clearly demonstrate that students are under-prepared upon leaving high school. How, then, can we explicitly teach math and language literacy while still covering the tremendous amount of content in high school and college introductory physics courses? This talk will suggest performance tasks as a way to help support students in developing literacy skills while introducing physics content.

This talk will:

(i) Discuss when and how to use these performance tasks in a high school or introductory college setting

(ii) Provide a set of templates to design these tasks
(iii) Give access to over 20 free activities across a variety of physics content areas

10:40 The Hand Boiler and How it does NOT Work

James Lincoln, President SCAAPT

The hand boiler is an intriguing physics demonstration that is perfectly suited to the high school classroom. The ubiquity of this device, and the many incorrect explanations of its workings, motivate this author to write and explain its physics correctly. In this talk I explain how the hand boiler works and provide supporting experiments that refute the incorrect explanations. Also included are a few well-tested hands-on activities for students and teachers to enjoy.

10:55 Catching Dark Matter with Density Waves

Noah Bray-Ali , Mount Saint Mary's University, Los Angeles

Dark matter keeps the Sun from shooting out of the galaxy and is not made of atoms. Density waves form in solids when electrons and holes form pairs that condense into a superfluid. In this talk we show how to catch dark matter using density waves.

11:10 Vendor Spotlight: "Physics Labs Delivered" STEM Mobile, Inc

Stem Mobile is a science equipment rental company and more. The company was launched in December 2019 and it currently services the southern California region. The STEM Mobile company has primary school, secondary school, college, and university level science equipment and science laboratory lab manuals and other hard and virtual related content that can be delivered to your institution within 24 hours. If your institution has limited resources, limited storage, or limited technical staff, then you may want to consider the services of STEM Mobile. Visit the STEM Mobile website www.stemmobileinc.com and browse through the many different science equipment rentals available that suit your interest. You may navigate to the Shop: Rental Deals to get familiar with the laboratory packages we have designed for an annual or semi-annual curriculum. STEM Mobile Inc. will be displaying various science laboratory equipment that are available for you on the website and we will offer a free trial period for the SCAAPT event attendees.

11:35 Business Meeting, Election

11:50 Lunch // Play with the STEM Mobile Labs

12:45 Show & Tell

1:10 EdPuzzle to the rescue!

Nanor Williams

During the pandemic many teachers including myself turned to online resources to help our students learn. EdPuzzle is one such resource. With Edpuzzle any video can become your lesson. You choose a video, give it your "magic touch" of questions and answers and then track your students' comprehension. In this talk I share anecdotes from how I use this program effectively and also explain its limitations, mistakes you can avoid, and provide a sample lesson.

1:30 The Modern Demo Room: Empowering Faculty while Minimizing Chaos

Kevin Coulombe, Cal Poly San Luis Obispo

At the Cal Poly SLO physics department we service over 90% (about 18,000 students) of the student population, maintain relatively small lab sizes, and provide an abundance of hands on opportunities within the classrooms. While this puts a significant burden on the support staff, both professors and students greatly benefit from having access to the variety of equipment. Within the department, we have found a way to create a positive and cooperative atmosphere between all of our technicians, and between the technicians and faculty. By creating a simple to follow organization structure for demos, easily accessible video tutorials, and clear communication expectations with faculty, the Cal Poly physics department has been able to thrive in recent years, and truly embody their alma matter of "Learn by Doing."

2:00 Keynote Address: Introducing the James Webb Telescope

John Hoot, Director, SSC Laboratories

Launched just last December, The James Webb Space Telescope is the most powerful telescope ever launched into space and its greatly improved infrared resolution and sensitivity will allow it to view objects too old, distant, and faint for the Hubble Space Telescope. The telescope is up-and-running and taking photos of objects never before seen. In this talk, hear the most recent updates and exciting news for the future.

3:00 Using the Science of Color to Model Astronomy

Brandon Rodriguez, NASA Jet Propulsion Laboratory

In this series of demonstrations, we will discuss how we can use simple classroom materials to model wavelength, color, and how we use both to study distant stars with missions such as the now retired Spitzer and upcoming James Webb Telescopes.

3:20 Autopsy of a Failed Extension Policy

Peanut McCoy, Azusa Pacific University

I have finally euthanized my extension policy, after years of wheedling and cajoling students to not procrastinate. In this talk, I will discuss the goals that I have for an extension policy and how my old

policy failed to meet them. I will also show data on how student abuse of extensions affected their learning and class performance. Finally, I will share a new and hopefully improved extension policy that I am trying out this semester.

3:35 An Exercise in Observation

Larry Stein, University of La Verne

From the video "A Trip Down Market Street," enhanced with sound and color we can make close observations and inferences. I ask my students a series of 25 questions on the 12 minutes long film. Normally, I don't display the questions ahead of time, but I do encourage note-taking. This exercise was also successfully performed for a Faculty Development talk.

3:50 Closing, Raffles, and Order of Magnitude