

Free Commercial Workshops

CW01: Perimeter Institute: Beyond the Atom: Particle Physics

Location: Galleria III
Date: Monday, July 15
Time: 9–10 a.m.
Sponsor: Perimeter Institute

Leader: Damian Pope

On July 4, 2012, researchers at CERN announced the discovery of a new particle. This announcement was the culmination of decades of work and billions of dollars invested in the Large Hadron Collider. It is the latest step in our journey toward understanding the fundamental building blocks of our universe. Come explore *Beyond the Atom*, a classroom resource designed by educators in collaboration with researchers from Perimeter Institute and CERN to introduce high school students to some of the fundamental ideas in particle physics. Participate in activities that engage your students in the journey from Rutherford scattering through to the LHC.

CW02: WebAssign: Using Online Homework to Achieve Your Pedagogical Goals

Location: Galleria I
Date: Monday, July 15
Time: 9–10 a.m.
Sponsor: WebAssign

Leader: Matt Kohlmyer

Since 1997, WebAssign has been the online homework system of choice for the introductory physics lecture courses. Through our partnerships with every major publisher, WebAssign supports more than 160 introductory physics textbooks with precoded, assignable questions, and advanced learning tools. In addition to textbook-specific questions and resources, WebAssign has question collections authored by experienced physics educators, designed to strengthen student skills and conceptual understanding. Learn about research-based additional resource collections (free to WebAssign adopters) that stress physics education research principles. We will also introduce a new question collection that features both feedback designed to address student misconceptions; tutorials designed to step students through complex problems and concepts; and a personal study plan designed to improve students' prerequisite math skills.

CW03: Perimeter Institute: Classroom Activities for Dark Matter

Location: Galleria III
Date: Monday, July 15
Time: 11:30 a.m.–1 p.m.
Sponsor: Perimeter Institute

Leader: Damian Pope

Are you looking for ways to connect your students with current physics research? Join us as we use a standard uniform circular motion lab to introduce students to dark matter. Learn about the latest theories and find out what experimental results are telling us about this mysterious phenomenon. Come explore the *Mystery of Dark Matter*, a classroom resource designed by educators in collaboration with Perimeter Institute researchers. See how high school physics concepts reveal the need for dark matter. Gain insight into the process of science as you listen to researchers discussing whether dark matter actually exists, what it might be, and how it could be detected.

CW04: PASCO scientific: A New Era for Computerized Physics Labs

Location: Pavilion West
Date: Monday, July 15
Time: 12–1 p.m.
Sponsor: PASCO scientific

Leaders: Ann Hanks and Jon Hanks

Join us to see how PASCO Capstone software can revolutionize how you

do labs. You have to try it to believe it and now is your chance! As you build your own PASCO Capstone electronic workbook from scratch, you will see the great advantages of having an “undo” operation, taking sample data within the workbook while writing the lab, and being able to add on extras like video analysis. Whether you use DataStudio or another type of interfacing software or have never used any interfacing before, you will benefit from this workshop. We will also have hands-on demonstrations of the new 850 Universal Interface which is called “Universal” because it works with all types of PASCO sensors (both the blue PASPORT and the black ScienceWorkshop sensors). One workshop participant will win a free PASCO Capstone Site License.

CW05: Pearson: Eugenia Etkina

Location: Pavilion East
Date: Monday, July 15
Time: 12–1 p.m.
Sponsor: Pearson Education

Leader: Eugenia Etkina

Eugenia Etkina (Rutgers University, Graduate School of Education—GSE) was born and educated in Russia, where she was awarded her PhD in Physics Education from Moscow State Pedagogical University. She has 30 years of physics teaching experience (teaching middle school, high school, and university physics). In 1993 she developed a system in which students learn physics using processes that mirror scientific practice. That approach was enriched when she began collaborating with Alan Van Heuvelen in 2000 and now is known as Investigative Science Learning Environment (ISLE). Since 2000, Professors Etkina and Van Heuvelen have developed curricula based on ISLE, conducted over 60 workshops for physics instructors, and published *The Active Learning Guide*. Please join Dr. Etkina for a discussion on the ISLE method and how it can be put into practice in your classroom using the new textbook, *College Physics*, by Etkina, Gentile, and van Heuvelen.

CW06: Perimeter Institute: Curved Spacetime and the Global Positioning System

Location: Galleria III
Date: Tuesday, July 16
Time: 9:30–10:30 a.m.
Sponsor: Perimeter Institute

Leader: Damian Pope

What is Gravity? Newton pictured gravity as an invisible force while Einstein pictured it as the curving of spacetime. Does it matter which model we use? Are there any predictions that determine which model is better? The *Revolutions in Science* classroom resource was designed by educators in collaboration with Perimeter Institute researchers to engage high school students in the process of building scientific models. In this workshop, we consider models for gravity and explore Einstein's curved spacetime model for gravity using masking tape and balloons. We will discover that Newton was wrong and that Einstein's model predicts time dilation which is verified daily by the Global Positioning System. The Global Positioning System (GPS) is a technology used by millions of people. The GPS & Relativity resource will introduce the basic operation of the GPS and will discuss how relativistic time dilation plays a vital role in every position calculation.

CW07: Physics2000.com

Location: Galleria I
Date: Tuesday, July 16
Time: 9:30–10:30 a.m.
Sponsor: Physics2000.com

Leader: Elisha Huggins

Come to the popular Physics2000 workshop where you learn how to include 20th century physics in the basic Introductory Physics course.

CW08: Pearson: MasteringPhysics

Location: Salon Ballroom I
Date: Tuesday, July 16
Time: 9:30–10:30 a.m.
Sponsor: Pearson Education

Leader: Will Moore

Please join Will Moore from Pearson Education for a demonstration and discussion about MasteringPhysics, Pearson's online homework and tutorial system. MasteringPhysics is designed to improve results by helping students quickly master concepts. Students benefit from wrong-answer specific feedback, hints, and a huge variety of educationally effective content while unrivaled gradebook diagnostics allow an instructor to pinpoint the weaknesses and misconceptions of their class.

CW09: Perimeter Institute: Hands-On Wave-Particle Duality

Location: Galleria III
Date: Tuesday, July 16
Time: 12:30–2 p.m.
Sponsor: Perimeter Institute

Leader: Damian Pope

Quantum physics describes the subatomic world with amazing accuracy but it also introduces some very strange ideas about the universe. Wave-particle duality is one of the deepest, most powerful, mysteries of quantum physics. Come explore the Challenge of Quantum Reality, a classroom resource designed by educators in collaboration with Perimeter Institute researchers to introduce senior physics students to the wonder and power of quantum physics. Experience the electron double-slit experiment as you participate in a hands-on classroom activity that will introduce the fundamental concepts involving the wave-particle duality.

CW10: Vernier Software: Data Collection Tools for Physics, including LabQuest2, Graphical Analysis for iPad, and Vernier Data Share for IOS and Android

Location: Pavilion East
Date: Tuesday, July 16
Time: 12:30–2:30 p.m.
Sponsor: Vernier Software & Technology

Leaders: David Vernier, Matt Anthes-Washburn, and John Gastineau

Attend this hands-on workshop to learn about LabQuest 2 and other new data collection tools from Vernier Software & Technology. We will start with an interactive presentation to show you how Vernier data collection works with both LabQuest and computer, and how the data can be shared with iPad or Android tablets, phones, and other computers. Then, we will make available a variety of new and interesting Vernier apparatus for you to investigate individually.

- Use the LabQuest 2 interface, and see its large color touch screen with the updated LabQuest App.
- Collect and analyze data on an iPad, Android tablet, or phone.
- View sensor data on your own phone, tablet, or computer with no software installation.
- Collect data in a browser, with a LabQuest 2 serving its data, and then analyze the data right in the browser. The browser can be on an Android tablet, or even your own smart phone.
- Collect data with the new Vernier Diffraction Apparatus, and see just how easy it is to map out intensity for single-slit and double-slit patterns.
- Inspect the rest of our optics system, including apparatus for doing thin lens or mirror experiments, color mixing, and polarization.
- Fire the new Vernier Projectile Launcher and use the new Time of Flight pad.
- Collect radiation data using our new low-cost Vernier Radiation Monitor.
- Page through the new "Advanced Physics with Vernier-Beyond Mechanics" book.
- Do some video analysis using Vernier Video Physics on an iPad.

CW11: PASCO scientific: A New Era for Computerized Physics Labs

Location: Skyline IV
Date: Tuesday, July 16
Time: 1–2 p.m.
Sponsor: PASCO scientific

Leaders: Jon Hanks and Ann Hanks

Join us to see how PASCO Capstone software can revolutionize how you do labs. You have to try it to believe it and now is your chance! As you build your own PASCO Capstone electronic workbook from scratch, you will see the great advantages of having an "undo" operation, taking sample data within the workbook while writing the lab, and being able to add on extras like video analysis. Whether you use DataStudio or another type of interfacing software or have never used any interfacing before, you will benefit from this workshop. We will also have hands-on demonstrations of the new 850 Universal Interface which is called "Universal" because it works with all types of PASCO sensors (both the blue PASPORT and the black ScienceWorkshop sensors). One workshop participant will win a free PASCO Capstone Site License.

CW12: Learn How Expert TA's Assignable Tutorials Can Help Improve Learning and Deter Cheating

Location: Skyline III
Date: Tuesday, July 16
Time: 12:30–2 p.m.
Sponsor: Expert TA

Leader: Jeremy Morton

Expert TA is a commercial online homework and tutorial system for introductory-level physics. It grades problems the way instructors do, considering more than just the final numeric answer. Expert TA has multi-step problems that involve more aspects of physics problem solving; such as symbolic equations, FBDs, algorithmic numeric answers, etc. The majority of our problems involve symbolic answers and our sophisticated math engine grades them in detail. It identifies detailed mistakes within an equation, deducts points, and provides specific feedback. Join us and learn about our highly customizable "Assignable Tutorials." You can decide whether students have access to hints and feedback, change deduction amounts and the number of submission attempts allowed, and select the style in which feedback is delivered. We will also demonstrate how you can monitor grades and student progress real-time; this includes being able to review detailed work as it happens. Expert TA has partnered with talented professors, leaders in physics education, to develop a rich library of original problems. We have mapped our library to the major textbooks so that you can always find the problems you are looking for, and we're working to keep solutions to our problems off the web to deter cheating.

CW13: Electron Investigation with 3B Scientific Teltron® Tubes

Location: Parlor A/B
Date: Monday July 15
Time: 12–1 p.m.
Sponsor: American 3B Scientific

Leader: Danny Mashburn

Electrons are a fundamental particle, but basic principles can be difficult to conceptualize. In our 3B workshop we will demonstrate how our Teltron® Tubes provide a quick and easy way to evaluate the properties and interactions of electrons. We will cover topics ranging from the wave like nature of electrons to their interactions with electric and magnetic fields. Come join us and learn how you can incorporate these experiments into your curriculum. Experiment guides and manuals will be available for all participants.