

Invited Talks

What happens when a Professional Society forms an Educational Partnership?

Fredrick M. Stein
Director of Education and Outreach
American Physical Society

PhysTEC is a program to improve the science preparation of future K–12 teachers. Begun in September 2001, it aims to help physics and education faculty work together to provide an education for future teachers that emphasizes a student–centered, hands–on, inquiry–based approach to learning science. The American Physical Society (APS), in partnership with the American Association of Physics Teachers (AAPT) and the American Institute of Physics (AIP), initiated PhysTEC in concert with national reports calling for the improvement of K–12 science teaching. The three professional societies will supply the guidance and oversight necessary to foster PhysTEC’s development into a truly national program. The program supports a Teacher–in–Residence (TIR) program that provides for a local K–12 master teacher to become a full–time participant in assisting faculty in course revisions and team–teaching, and to act as a "reality check" for both preservice teachers and university faculty; the redesign of content and pedagogy for targeted physics and education courses based on results from physics education research, and to create Mentor and Induction programs for PhysTEC graduates. <http://www.phystec.org/>

So, What WOULD Happen If a Magnet Were Dropped Down a Superconducting Tube?

..... or.....The Meissner Effect Revisited

Ron Brown
Department of Physics
Cal Poly San Luis Obispo

It has been nearly fifteen years since this question first was posed to a small group of physicists and physics teachers – including, John Rigden, David Goodstein, and Richard Feynman, and a number of others – immediately following a meeting of the Southern California AAPT (November, 1987). The animated discussion of the many speculations that followed was sheer joy. Then a surprising answer was offered by Caltech’s Goodstein – which evoked an immediate and gleeful "Of course!" from Feynman (and I might add, from the rest of us as well!). It was like being on hallowed ground, as John Rigden was later to write. The question is, what did Goodstein say that the rest of us agreed with so quickly? And why do we think his answer was right? This discussion will include how magnets and superconductors interact, Faraday’s law, the Meissner effect, and London’s equation, magnetic forces, induced currents and persistent currents – and which of those principles and ideas are important to answering this question. And the answer will be clear.

AAPT Joint Meeting

Friday, April 26 – Cal Poly San Luis Obispo

9:30 – 10:00, 12:30 – 1:00, 3:00 – 3:30, & 6:00 – 7:00 PM Registration (Follow the signs to the Science Building.)

10:00 – 4:00 PM Workshops – Science Building (Bldg. 52) – Rooms E22, E31, and E34

Workshops will be held in the Science Building. The info/registration table in the building's front entrance will have room numbers. Spaces are still available in the workshops.

"New Teacher Workshop" (10 – 4 PM) Paul Robinson and other Vets

This popular workshop is being offered on Friday (instead of Saturday) so that participants don't have to miss out on the contributed papers. If there are insufficient signups for Friday, we may revert to a Saturday format. It is intended for teachers who are either new to teaching physics and/or those who have been at it for a while but still feel like they're new! All new teachers will be networked with experienced teachers. The workshop includes valuable teaching tips, goodie bags, raffles where everyone wins, question and answer panels, popcorn, and more! Although there is no fee, interested participants should email Paul at laserpablo@aol.com to register or for more information.

"Getting the Most Out of MBL" (10 – 4 PM) Clarence Bakken, Gretchen DeMoss

Are you thinking about starting computer or calculator-based interfacing in your physics labs? Have you been using MBL for a while and are looking for ways to get more depth from your labs? Or do you just want to see a variety of applications of computer interfacing that will fit nicely into your curriculum? Join Clarence Bakken, Gunn High School, and Gretchen Stahmer-Demoss, of Vernier Software in a hands-on workshop using LabPro and a wide assortment of sensors. Although there is no fee, please email Clarence at clarence@cbakken.net to register or for more information.

"Pasco Workshop" (1 – 4 PM) Cynthia Nielson

Topic TBD. Contact Forouzan Faridian at ffaridia@lausd.k12.ca.us for the latest info and/or to register for the workshop.

7:00 PM Dinner

Dinner will be a Mexican buffet at the Sandwich Factory, adjacent to the Science Building. After dinner, Richard B. Frankel, Cal Poly San Luis Obispo, will present an informal update on "**The Question of Ancient Life on Mars**" a talk presented at the 1997 Joint Spring Meeting. Sign up for dinner (\$19/person) when you register for the meeting at <http://atom.physics.calpoly.edu/aapt/>

AMERICAN ASSOCIATION OF PHYSICS TEACHERS

Joint Meeting of the Northern California/Nevada Section & Southern California Section

Saturday, April 27, 2002

Science Building, Cal Poly San Luis Obispo – Host: Ron Brown & Tom Bensky

8:15 – 9:00 Registration, Exhibits, Coffee, and Donuts (Building 33 near Room 286)

9:45 – 3:00 Poster session

"Peer-Led Team Learning for a College Physics Preparatory Course"

Dominic Calabrese, Sierra College, dcalabrese@scmail.sierra.cc.ca.us

A Peer-Led Team Learning Workshop Model for a college physics preparatory course at Sierra College will be described. Workshops consist of teams engaged in collaborative problem solving, model building, and discussion of physics concepts. The workshops consist of weekly two-hour sessions that are facilitated by a peer leader. Peer leaders are students that have successfully completed the course. Each workshop is limited in size with a minimum of four students and a maximum of eight students. Although participation in the workshop portion of the course is not mandatory, but highly recommended, extra credit points are given to students that consistently attend the weekly sessions. Workshop leaders meet with faculty on a weekly basis to review curriculum and discuss student progress. Although materials^{1, 2} for the PLTL Workshop curriculum are readily available, they are specifically designed for traditional calculus and non-calculus based college physics courses. As a result, a new curriculum for the PLTL workshop has been developed. Preliminary research and evaluation data will also be presented. Financial support from Workshop Project Associate Program under the auspices of the NSF Peer-Led Team-Learning: National Dissemination by the Workshop Project (Grant Number DUE-0004159000) is greatly acknowledged.

1 www.lclark.edu/~kolitch

2 Mazur, Eric, Peer Instruction: A User's Manual, Prentice Hall, Inc., Upper Saddle River, NJ, 1997.

"Analysis of Simulated Top Quark Decays in the D-Zero Experiment"

Daniel C Kiminki, Sarah D Johnson, University of La Verne, johnsosa@ulv.edu

We used Onetop simulation software to generate single top quark events in the D-Zero experiment. The transverse momentum and pseudorapidity distributions for the top quarks and their decay products were compared to the distributions obtained using CompHEP simulation software. Good agreement was seen between the distributions in most cases though discrepancies still exist and require further study.

"A Student Determination of Boltzmann's Constant"

Dyan Pratt, Cal Poly Pomona,

An improved method to determine Boltzmann's constant using latex spheres in a drop of water will be described. The nearly neutral buoyant spheres are observed to follow Perin-Einstein equations.

9:00 Welcome (Building 33 – Room 286)

Glenn Malin, Pres., So Cal Section

Dave Wall, Pres., No Cal/Nev Section

Phil Bailey, Dean of the College of Science and Mathematics, Cal Poly, San Luis Obispo

9:15 Invited Talk

"What happens when a Professional Society forms an Educational Partnership?"

Fredrick M. Stein, Director of Education and Outreach, American Physical Society

9:45Break Time to visit the exhibits or the poster session

10:00 " Scientific Ballooning in the Classroom"

Steve Kliewer, Stu Briber, & Joe Manildi, Paso Robles H.S., skliewer@charter.net

Take your students to the edge of space. Scientific ballooning is not only exciting but exemplifies science at its best. Last summer, a group of high school teachers participated in the high altitude balloon test of the GLAST gamma ray telescope satellite. The National Scientific Balloon Facility (NSBF) not only graciously supported our own low altitude tests but is inviting teachers to submit student scientific experiment proposals for high altitude test. The teachers have developed a website that displays the results of the ballooning tests as well as information and ideas to help other teachers use ballooning in their classes. This summer, the University of California, Santa Cruz, is offering a two week program for teachers. Some of the most knowledgeable professors in the world will be talking with us about atmospheric, particle, and astrophysics as well as helping us with hands-on development and test of balloon experiments and data acquisition hardware that we can use in the classroom as well as at the NSBF.

10:20 " Nuclear Fusion Reactions"

Rashmi Arora, Panjab University, arorarashmi@rediffmail.com

Low energy Fusion Reactions using Energy Density Formalism

10:40 " Applications of Physics Associated with Cataract Surgery"

Paul Peter Urone, California State University, Sacramento, ppu@csus.edu

There are numerous interesting applications of physics associated with cataract surgery. Many are appropriate for use in illustrating physical principles in high school and university physics instruction. Among these are preoperative measurement of the size and shape of the eye using ultrasonic and laser techniques, removal of the lens using an ultrasound cutting tool and implantation of an interocular lens. I will illustrate these with numerical examples and will supply additional technical information appropriate for classroom use.

11:00 "Did Roemer Measure the Speed of Light?"

Harry Manos (retired), HMANOS@aol.com

Everyone knows that Roemer was the first person to measure the speed of light in free space, using the periodicity of eclipses of Jupiter's moons and the time differences for light from the moons during eclipses to reach the earth in its various positions in its orbit. It has to be right, because the information and description of the way he did it is in 50 physics textbooks and encyclopedias. What everyone doesn't

know is that it never happened.

11:20 "Anatomy of a Homer"

Paul Robinson, San Mateo High School, laserpablo@aol.com

Since many high school courses study projectile motion about the same time as the playoffs and World Series, baseball is easy to capitalize on student interest in baseball. It is an excellent way to discuss trajectories, estimated distances of home runs, effects of air friction, vector components, maximum heights, etc. in a fun and engaging manner. An analysis of Barry Bonds 73rd homer will be presented as an example.

11:40 "X-Ray and Radio Emission from ESO 295-IGO22"

Edward R. Waluska, ewaluska@msn.com

The X-Ray and radio emission from the galaxy pair ESO 295-IGO22 is examined within the Abell S0102 cluster. The significance of the morphology and frequency of the radio and X-ray emissions are accounted for from theory and an analysis of the data received from the NGC 300 ATCA observations. The purpose of this multi-frequency analysis is to explain the primary source of emission from ESO 295-IGO22.

12:00 Lunch At the Veranda Cafe, about a minute walk from the meeting rooms. There will be a salad/sandwich buffet. \$11/person. Sign up when you register for the meeting at <http://atom.physics.calpoly.edu/aapt/>

1:15 "Show and Tell"

Paul Robinson, Dave Wall, Paul Peter Urone, and Myron Mann

2:00 Invited Talk

**So, What WOULD Happen If a Magnet Were Dropped Down a Superconducting Tube?
..... or.....The Meissner Effect Revisited**

Ron Brown, Department of Physics, Cal Poly San Luis Obispo

2:45 Break

3:00 "How an Airplane Turns"

Paul Robinson, San Mateo High School, laserpablo@aol.com

Students first learn about banking angles when they first attempt to ride a bicycle. On a flat surface, friction is required to make the turn. However, if the turn is banked the horizontal component of the normal force provides the (centripetal) force. In theory, turning an airplane is as easy as riding a bicycle!

3:20 "Using Interactive Physics to Explore the Physics of Gases"
John Mallinckrodt, Cal Poly Pomona, ajm@csupomona.edu

Interactive Physics is easily used to create a wide variety of visually compelling illustrations of gas laws. In this talk I will show a number of movies I have created with Interactive Physics demonstrating the microscopic basis for buoyant forces, the approach to equilibrium, equipartition, evaporative cooling, and the second law of thermodynamics.

3:40 "A Robotic 2.5-Meter Telescope at Mount Laguna for CSU Astronomy"
Paul B. Etzel, San Diego State University, etzel@sciences.sdsu.edu

A Robotic 2.5-meter telescope has been proposed for construction at SDSU's Mount Laguna Observatory (MLO), which is located at a dark site at elevation 6100 feet on the eastern edge of the Cleveland National Forest 45-mile east of downtown San Diego. MLO currently has three research telescopes of 1.0, 0.6, and 0.4-meter aperture (see <http://mintaka.sdsu.edu/facilities/Facilities.html>). It is now served by a 45 Mbps Internet service provided by the High Performance Wireless Education and Research Network (HPWREN) under a NSF grant to the University of California, San Diego. HPWREN now makes it possible to send quickly large numbers of astronomical images directly to an astronomer's home institution. Limited numbers of visiting astronomers from other CSU campuses have used MLO in the past. In Fall 2001, Fred Ringwald of CSU, Fresno participated in two "remote" observing runs where hundreds of CCD images were sent directly to his office for near-real-time analysis while SDSU astronomers observed for him on the 1.0-meter telescope. The proposed Robotic telescope would queue-schedule multiple observing requests during a given night, with observations being sent directly to requesting astronomers and students. High-profile projects of a global nature (e.g., gravitational microlensing events, gamma-ray bursts, supernovae recovery) would be included. Liverpool John Moores University is now installing on La Palma the first 2.0-meter telescope in a proposed global network. Two additional telescopes have been funded by the Faulkes Foundation for the UK National Schools Observatory. The MLO telescope would fill an important longitude range in this growing global network. SDSU and NASA's Laboratory for Astronomy and Solar Physics have entered into a cooperative agreement to share 10% of this telescope time in exchange for advanced instrumentation. Other CSU campuses are invited to participate.

4:00 "The Science Niche of the 2.5 m Telescope at Mount Laguna Observatory"
Joseph F. Dolan, San Diego State University, tejfd@splvin.sdsu.edu

Although the 2.5 m telescope proposed for SDSU's Mount Laguna Observatory (MLO) is considered to be only a medium-aperture telescope today, it is ideally suited to several important observing programs in modern astrophysics. Regularly spaced (~ every other night) photometry/ polarimetry of gravitational lens systems by a dedicated telescope would provide the most accurate measurements of the Hubble constant. The discovery of additional optical counterparts of radio pulsars and the photometric/ polarimetric/spectroscopic analysis of their pulse profiles in the optical would confirm/confront our current theories of pulsar radiation mechanisms and neutron star evolution. The detection of reprocessed pulses in the optical from X-ray binary systems will result in realistic neutron star equations of state, our only method of determining the physics of matter at nuclear density. Participation in the proposed global network of 2+ m class telescopes will contribute to our understanding of the nature of the deflecting

masses involved in gravitational microlensing and the origin of gamma-ray bursts. The Laboratory for Astronomy and Solar Physics at NASA Goddard Space Flight Center will also use the telescope to test prototypes of instruments intended for space flight use.

4:20 "EM Wave Simulation"

Carl Rosenkilde, Bellarmine College Preparatory, crosenkilde@bcp.org

: The penultimate topic in the study of electromagnetism is the electromagnetic wave. By this time much classroom effort has been spent practicing the orientation and directionality of current and magnetic loops via the right-hand rule and Lenz's law in order to develop the coupled nature of the laws of electromagnetism. It is this coupling, which causes the electric and magnetic fields in a wave to simultaneously regenerate themselves via the laws of induction. With your help I will outline a participatory demonstration, which is designed to illustrate this mode of regeneration against the background of the previous development and engage a number of the students "up front" animating the "wave" for the remainder of the class.

4:40 Order of Magnitude Contest Winner and Door Prizes

5:00 Adjourn