

NEWS FROM THE SOUTHERN CALIFORNIA SECTION AAPT

The Spring 2004 meeting of the Southern California Section was held Saturday, April 3 at UCLA. The meeting began with registration, refreshments, and exhibits. A 90-minute workshop, "Low-Cost Physics Experiments for Overcrowded and Poorly Equipped High Schools Classrooms " was conducted by Gary Reynolds and Dean Papadakis. A "Tour of UCLA's Plasma Physics Laboratory" was given by Walter Gekelman; and a "Tour of UCLA's Visualization Portal" was led by Matt Malkan.

Forouzan Faridian, SCAAPT President, presided over the general session. Walter Gekelman, the UCLA host, welcomed the audience of about 60 participants. There were two contributed papers: "Is Pressure Really Lower in a Moving Fluid?" by Evan Jones, Sierra College; and "SPECTRA Teachers Workshops," by Sarah Johnson, University of La Verne.

The first invited talk was "Development and Implementation of Online Physics Courseware," by Maha Ashour-Abdalla and David Schriver, UCLA Center for Digital Innovation. The presentation focused on distance learning courseware developed by the Center for Digital Innovation at UCLA for high school students. AP on-line courses are targeted at students whose high schools do not offer such courses. Students can take this course entirely on-line and receive a grade that is fully equivalent to an in-class grade. Conventional in-class lecture periods are reproduced on-line using animation, video and voiceover. Assessment in a variety of forms including logic tracing, quizzes and problems are included and a "cyber-teacher" monitors student progress. A discussion of the pedagogy behind the courseware was presented along with a presentation of an AP physics course.

The second invited talk was "Unveiling a Supermassive Black Hole at the Center of our Galaxy," by Andrea M. Ghez, UCLA. It is believed that galaxies such as the Milky Way might harbor massive, though possibly dormant, central black holes. Definitive proof for or against the existence of a massive central black hole lies in the assessment of the distribution of matter in the central few parsecs of the Galaxy. The motion of the stars in the vicinity of the putative black hole offers a robust method for accomplishing this task. Adaptive Optics techniques on the W. M. Keck 10-meter telescope, the largest optical/infrared telescope in the world, provides a unique opportunity to study the Galaxy center at unprecedented resolution. Ghez and coworkers made the first measurement of spectral absorption lines in one of the high velocity stars, which just this year made near its closest approach to the black hole. Studies of the newly identified star S0-16, which passes a mere 90 AU from the center of the dark mass at a velocity of 9,000

km/sec, provides the strongest case yet for the presence of a supermassive black hole at the center of the Galaxy.

The third invited talk was "When Plasmas Collide," by Walter Gekelman, UCLA. Most of the observable universe is in the plasma state -- i.e., one or more electrons have been stripped from every atom resulting in matter that is electrically charged. With quiescent and highly reproducible plasma sources such as the Large Plasma Device at UCLA it is possible to make three dimensional measurements as a function of time. The expansion of a dense, rapidly moving plasma into a background plasma which can support a variety of waves was described. The dense plasma is created by a pulsed 150 MW laser beam striking a solid target imbedded in the background plasma. The initial plasma burst is directed across the ambient magnetic field. The interaction results in the production of a variety of intense waves, namely, electron plasma, whistler, lower hybrid, and Alfvén waves, and large density perturbations. Magnetic fields, temperature, and electric fields are measured with over 100 specially designed probes. It was shown how the currents develop and how they radiate waves, illustrating the subtle behavior of a nonlinear system.

In the ever-popular Show and Tell, Marty Simon of UCLA demonstrated "Einstein's Elevator," namely, a projectile fired in a falling elevator; magnetic levitation of a diamagnetic graphite disk; levitation of a superconducting flux-trapping magnet that works even upside down, with the magnet under a permanent magnet assembly; cooling a graphite circuit element, thereby dimming a light bulb because graphite's resistance increases with decreasing temperature -- with the reverse effect when copper replaces the graphite; cooling of a green LED in liquid nitrogen, changing the light color to yellow; standing waves on a string using a "black light" and strobe light; and diffraction of light from continuous and discrete spectrum sources.

Francisco Izaguirre showed that a light bulb filament can be made to glow brighter by blowing on the filament of another bulb (minus its glass envelope) in series with it; predicted where a plastic protractor will break when twisted, based on examination of the stress pattern made visible using polarized light; used piezoelectricity to light a bulb; and used a piezoelectric-generated spark to propel a film canister containing a small amount of alcohol. Scott Cameron connected two balloons with a tube and the one with relatively little air transferred its air to the one containing much more air. Cliff Gerstman showed a video produced by the Future Scientists and Engineers of America (<http://www.fsea.org>). Glenn Malin found the center of gravity of a masonite map of California; showed reflection of polarized laser-pointer light off a chalk board and off a glass pane held in contact with the chalk board; and pulled

a paper attached to a string out from under a vertical hammer without disturbing it. Steve Cooperman showed how an object can be made to float in a very small amount of water.

The Order-of-Magnitude contest question, posed by John Mallinckrodt, was: "What per capita land area would be the result of a 1% per annum world population growth sustained for the next 1000 years?" The winner, with the median answer of 1.08 square meters, was Al Siger. His prize was the book "Apparatus for Teaching Physics," published by AAPT.

The following door prizes were given: \$50 gift Vernier gift certificate to Scott Cameron; \$25 gift Science Kit and Boreal certificates to Jacob Morris and Glenn Malin; Addison Wesley carrying bag to Dean Papadakis, and Addison Wesley coffee mug to Bill Layton.

Special thanks are due to Bill Layton and Walter Gekelman, who invited UCLA speakers and arranged the excellent facilities provided by UCLA. Their hard work made this stimulating meeting possible.

Southern California section information can be found at the URL <http://www.csupomona.edu/~scaapt>.

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