

NEWS FROM THE SOUTHERN CALIFORNIA SECTION AAPT

The Fall 2003 Meeting of the Southern California section was held Saturday, October 25, at the California Institute of Technology. The local host was Kenneth Libbrecht. The SCAAPT meeting organizer was Forouzan Faridian.

The meeting began 8:15 AM with refreshments and exhibits. At 8:30 AM two workshops began. "What's new at Vernier Software," led by Clarence Bakken, demonstrated a combination of basic and advanced features of Vernier's new Logger Pro 3.2. Participants were given the opportunity to work with the equipment. The second workshop was "Laboratory physics for big classes in poorly equipped, poorly funded high school classrooms," led by Bill Layton and Gary Reynolds. Participants worked through high school laboratory lessons in mechanics, optics, and electrostatics, enabling hands-on experience for all students in big classrooms. Take-home equipment was provided for each lab.

In parallel with the workshops was a fascinating tour of Caltech's world class quantum optics lab, led by Theresa Lynn, and an equally fascinating tour of its unique Laser Interferometer Gravitational Wave Observatory Laboratory (LIGO) prototype, led by Alan Weinstein.

Formal presentations began directly after the workshops and tours. The program was opened by Glenn Malin, SCAAPT president. Kenneth Libbrecht, Executive Officer for Caltech's Physics Department, gave welcoming remarks.

Theresa Lynn, of Caltech, presented "Ultra-High Energy Cosmic Rays in Classrooms: The CHICOS Research Project. CHICOS is an acronym for California High school Cosmic ray ObServatory, a collaboration of Caltech, CSU Northridge, UC Irvine and Los Angeles area schools to study ultra-high energy cosmic rays with an array of detectors distributed over the L.A. area. Next, Bob Coutts of California State University, Northridge presented his findings in an experiment correlating the cosmic ray intensity with altitude from sea level to 10,000 feet using a CHICOS portable detector.

Kenneth Libbrecht of Caltech, presented an invited talk, "Morphogenesis on Ice: A Close Look at the Physics of Snowflakes." He described the growth of ice crystals from the vapor phase as a case study of the non-equilibrium dynamical processes governing crystal growth in general. Ice is particularly interesting because the growth rates of both the basal and prism facets vary strongly and non-monotonically with temperature. Much of this behavior is thought to be related to the onset of surface melting at approximately -15C, although many theoretical uncertainties remain. In addition to normal

growth, experiments have been done to examine the effects of strong electric fields on diffusion-limited needle crystal growth. Both theory and experiments show the onset of an unusual growth instability at high voltages, leading to the rapid growth of thin needle crystals.

In the afternoon session, David Goodstein gave an invited talk on "Science and the Law." A 1993 decision of the U.S. Supreme Court makes judges responsible for deciding the validity of scientific expert testimony. This talk was based on a chapter Goodstein wrote for the Reference Manual on Scientific Evidence, a book published by the judicial branch of the federal government that guides all federal judges and many state judges in applying that decision. He reviewed some history, discussed a number of theories of how science works, described what a career in science is like, exploded a number of myths about science, compared science and the law, and, finally, gave a scientist's evaluation of the 1993 Supreme Court decision.

The second afternoon invited talk was, "Weird Gravity? Phantom energy and the 'Big Rip'," by Marc Kamionkowski. He discussed a new theory developed in collaboration with Robert Caldwell and Nevin Weinberg to explain empirical evidence that the expansion rate of the Universe is increasing. The theory entails an antigravity fluid that pervades the Universe with an energy density that increases with time. The theory predicts, in startling detail, how this would lead to the destruction of the Universe. Over a long time period, our Sun would be ripped from the Milky Way, which itself would be torn apart by the "phantom energy." Ultimately even atoms would be ripped apart.

Two contributed talks were given. George Kuck of CSU Long Beach, presented "Do they get It?" and Rafael Enfiadjian, Santa Monica College, spoke on "Derivation of universal gravitation force by Newton."

Show and Tell demonstrations were "Restoring a broken cup (an index of refraction demo)" by Daniel Duncan, "Low-cost distillation condenser" by Gary Reynolds, "Seeing discrete and continuous spectra using rainbow glasses" by Ron Armale, "Starting a fire by rubbing two pieces of wood together" by Jonathan Stamper, and "Exciting a phosphorescent material with diode lasers" by Dean Papadakis. Glenn Malin demonstrated several gems he learned at the PTRS Summer Program: "Using spacer tiles to depict + and - charges on an OH projector," "Constructing a one-radian angle from three cardboard rulers," "Hearing a metal pie tin undergo electrical discharge," and "Building \$10 motor-propeller units to help demonstrate Newton's laws." Nuria Rodriguez demonstrated "Using optical illusions to begin the study of optics," and "The effect of slowly covering a lens that project a real image." Dick Kenealy presented a variety of demos,

including "Tesla coil and light bulb," "Using heat and water vapor to blow up a balloon," and "Color mixing." Forouzan Faridian described "Getting free lenses from stores that dispose of disposable cameras" and Leigh Palmer described a compelling "Perpetual motion machine that can be disproved using high school physics."

Four people tied in the Order of Magnitude Contest: "How long a line would be formed by setting the atoms in a grain of sand side-by-side?" They all had the mean answer among all participants, namely, 10^{10} meters. Ron Armale won a \$50 Vernier gift certificate, Paul Hsu won a \$50 Science Kit & Boreal Lab gift certificate, Tilahun Eneyew won Vernier Logger Pro 3.2 software, and Steve Cooperman won a yo-yo donated by W. H. Freeman (related to their book, Physics for Scientists and Engineers, by Tipler and Mosca).

In a business meeting, the following officers were elected to one-year terms: President, Forouzan Faridian; Vice President, Sarah Johnson; Vice President for High Schools, Gary Reynolds; Secretary, Nuria Rodriguez; Treasurer, Mary Mogge; Editor, John Mallinckrodt; Section Representative, Harvey Leff. Past President is Glenn Malin.

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

Harvey S. Leff
Section Representative