The 2003 Palke Lecturer

Eric Johnson Heller (b. 1946) lives in Lincoln, Massachusetts, and is a member of the Physics and chemistry faculties of Harvard University. After receiving his Ph.D. with Bill Reinhardt at Harvard in 1973, Heller took a postdoctoral position with Stuart Rice at the University of Chicago. Starting in 1975, Heller joined the chemistry faculty at UCLA. He took a sabbatical at Los Alamos National Laboratory in 1981, ultimately joining LANL as a staff scientist until 1984, when he accepted a faculty position in chemistry at the University of Washington. In 1993, Heller joined the Department of Physics at Harvard, concurrently as Director of the Institute for theoretical Atomic and Molecular Physics at the Harvard-Smithsonian Center for Astrophysics. In 1998, Heller became Harvard's first Professor of both Chemistry and Physics.

Heller has been elected a Fellow of the American Academy of Arts and Sciences, The American Association for the Advancement of Science, and the American Physical Society. He is the 2003 recipient of the Joseph O. Hirschfelder Prize.

Heller's research has ranged widely, but two themes run through much of his work. One is an abiding interest in the Correspondence Principle, and its "semiclassical" applications in real world calculations. This led to early contributions to time dependent semiclassical methods, including wavepacket propagation, and led to time dependent (though not necessarily semiclassical) formulations of molecular spectroscopy. These formulations are now widely used to calculate and interpret molecular spectra. The Correspondence Principle also underlies his research into quantum chaos, where subtle questions still exist regarding the relation between the quantum and classical mechanics of classically chaotic systems.

The second major theme is scattering theory, including gas-surface collisions, neutron scattering, and scattering in mesoscopic and nanoscale systems. This has often had a semiclassical component, but more recent work has centered on the extreme quantum regime, including ultracold atom and atom-surface collisions, multiple scattering theory (where Heller discovered a new effect, "proximity resonance", which is the particle analog of superradiance), and electron propagation in waveguides and resonators. In 1994, Heller first explained Don Eigler's "quantum corral" STM work as due to maximally decohering electron-atom multiple scattering. More recently, he has explained the beautiful "branched and fringed electron flow" in semiconductor heterostructurees, discovered experimentally by Bob Westervelt's group at Harvard.

The Department of Chemistry & Biochemistry

University of California, Santa Barbara

presents the

4th Annual

W.E. Palke Memorial Lecture

Thursday, April 17, 2003

Engineering II Pavilion

4:00 P.M.

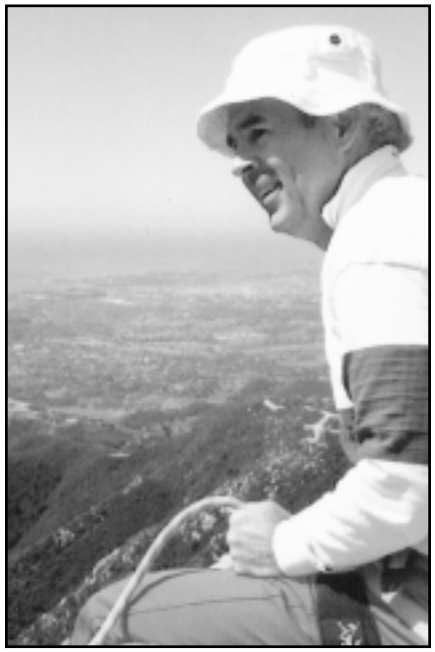
Reception to follow the lecture in 4606 PSB North

William E. Palke, professor in the UCSB Chemistry Department for 31 years, died on May 10, 1999 from a heart attack. He was 58 years old. To many, he was more than a professor. He was a scientist, colleague, hiking companion, rock climber, and friend.

Professor Palke did his graduate work with W.N. Lipscomb at Harvard, receiving his Ph.D. in 1966. There followed two years of postdoctoral work as an A.A. Noyes Fellow at Caltech where he worked in collaboration with Professor William Goddard. Then in 1968, he came to UCSB as an assistant professor in theoretical chemistry.

His first scientific publication came in 1962 from undergraduate work done with Professor Fred Anson at Caltech. Some 37 years and 84 papers later, his most recent paper appeared in the *Journal of Magnetic Resonance*. Professor Palke was a great collaborator. In our department he was a major resource for many graduate students and co-authored papers with 10 different faculty members.

By and large, the work of Professor Palke fell in five areas. He developed efficient computational methods for determining wave functions used in evaluating properties of molecules. He sought to understand the quantum details of chemical bonding. He analyzed the different factors that give rise to the barriers to internal rotation in molecules. He applied density functional theory to relate the electron density in molecules to molecular properties. In recent years, he extended the theory of relaxation effects in nuclear magnetic resonance experiments. This work resulted in a set of computer programs that, for the first time, permitted calculation of the spectra exhibited by complicated spin systems interacting in general ways.



Down through the years Professor Palke taught a variety of courses including General Chemistry, Environmental Chemistry, Physical Chemistry, Statistical Mechanics and Quantum Chemistry. He was widely regarded as one of the best teachers in the department. He is sorely missed.

Program

Bill Palke Remembered

Bernard Kirtman, Professor of Chemistry, UCSB

Introduction of the 2003 Palke Lecturer

Horia Metiu, Professor of Chemistry and Physics, UCSB

Lecture

"*Electron Waves in New Regimes: Quantum Corrals and Quantum Dots*"

Eric J. Heller

Professor of Chemistry and Professor of Physics
Harvard University

The Palke Lecture series is supported by an endowment provided by Professor Palke's family, co-workers, students and friends. Contributions to the fund are welcome at any time and may be addressed to the Chair of the Department of Chemistry and biochemistry, UCSB.