

UNH Materials Science Seminar

11:00-12:00, Thursday, September 30, 2004

DeMeritt Hall 209B

University of New Hampshire

Electronic Excitations of Carbon-60 and its Anions

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Isolated, highly excited C_{60} molecules in the gas phase cool via several competing channels: emission of radiation, carbon dimers, and electrons. The temporal evolution of the latter provides insight into the other, more elusive channels. However, it has been questioned if electron emission is a truly statistical process akin to thermionic emission because the lowest excited electronic state (T_1) in cold C_{60} is known to have a long lifetime, and photoexcited molecules are easily trapped in T_1 . We use two pulsed lasers to determine the lifetime of T_1 at higher temperatures. The lifetime rapidly decreases with increasing vibrational energy content of the molecule. Therefore, electron emission from hot C_{60} is truly statistical and does, indeed, provide information about the competing channels.

In the second part of the talk I will discuss a spectroscopic study of C_{60} anions in an ion storage ring. The absorption spectrum in the near-infrared, corresponding to transitions between the highest occupied and the lowest unoccupied molecular orbitals, shows structure arising from the Jahn-Teller effect, a quantum mechanic effect that leads to structural distortion of the otherwise highly symmetric C_{60} .

Olof Echt received his PhD from the University of Konstanz, Germany, in 1979 where he continued until he joined UNH in 1989. He has spent a year at Penn State as postdoctoral researcher, a year at the Niels Bohr Institute as guest professor, and held visiting professorships at several universities in Germany, Austria, Denmark and Sweden. His early research was in nuclear physics and application of nuclear techniques to the study of radiation damage in solids. During the past two decades his interest changed to atomic clusters: magic numbers, spontaneous dissociation of singly and multiply charged cluster ions, binding energies, energy releases, and the photophysics of fullerenes. Another area of interest is growth of thin films by pulsed laser deposition.