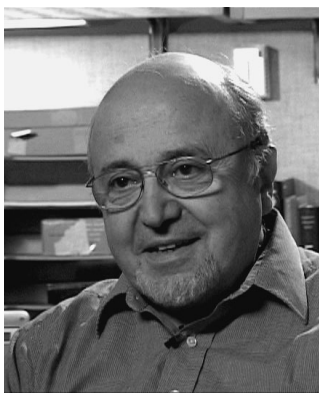
Helium Nanodroplets: Novel Finite Quantum Fluids and a Chemical Laboratory

THE FRANKLIN INSTITUTE
Awards

Symposium Honoring

Giacinto Scoles and J. Peter Toennies

J. Peter Toennies



Giacinto Scoles

2006

Benjamin Franklin Medal in Physics

For the development of techniques to study molecules embedded in superfluid helium nanodroplets by high-resolution spectroscopy. These techniques allowed for the investigation of reactive and fragile molecules that could not be examined in other ways, and also enabled studies of superfluid helium with unprecedented precision, yielding insights into superfluidity at the nanoscale level.

Helium is the only substance which forms the fourth state of matter, the superfluid state. However, until recently superfluid helium has not found any practical applications, mainly because it expels all other atoms or molecules. Only in 1992 Scoles *et al.* have shown that it is possible to mix in other substances with superfluid helium if helium is formed as small droplets, called nanodroplets, containing only a few thousands atoms. At that time, it was not clear whether such droplets are actually superfluid. This was shown by Toennies *et al.* in 1995 by precise measurements of spectra of molecular impurities in nanodroplets. This discovery greatly improved our understanding of the mechanisms of superfluidity. The early work of Scoles and Toennies led to the formation of a new and very powerful experimental technique, called helium-nanodroplet spectroscopy. Superfluid helium forms a gentle matrix around the impurities and due to its very weak interactions with other species allows measurements of the spectra with precision not much lower than in the gas phase. Consequently, helium-nanodroplet spectroscopy allows very accurate probing of molecules or clusters which cannot by investigated by any other method. This includes "fragile" molecules, radicals, and clusters in secondary minima.

Thursday, April 27, 2006

8:30 a.m. – 12:20 p.m.

Trabant University Center

University of Delaware

Newark, Delaware

University of Delaware

As part of the award ceremonies, a symposium (free and open to the public, but Web registration is required) will be held at the University of Delaware on Thursday, April 27, from 8:30 A.M. to 12:20 P.M.

Helium Nanodroplets: novel finite quantum fluids and a chemical laboratory

Symposium Honoring Giacinto Scoles and J. Peter Toennies
Co-sponsored by: The Franklin Institute and the University of Delaware

Program:

8:30–9:00	Breakfast
9:00–9:10	Opening: David Roselle, President, University of Delaware Peter Collings, Chairman, The Franklin Institute Committee on Science and the Arts
9:10–9:40	Bob McKellar (Ottawa): *High Resolution Infrared Spectroscopy of Quantum Helium Nanoclusters*
9:40–10:10	K. Birgitta Whaley (Berkeley): *Understanding the Relationship between Superfluidity and Spectroscopy in Helium Droplets*
10:10–10:40	Kevin Lehmann (Virginia): *Spectroscopy and Dynamics in Helium Nanodroplets: Results from the ScoLehmann Group*
10:40–11:10	Coffee break
11:10–11:45	Giacinto Scoles (Princeton and Trieste): *Helium Nanodroplet Isolation Spectroscopy of Small Metal Atom Clusters and Complexes*
11:45–12:20	J. Peter Toennies (Max Planck): *New Horizons in Helium Nanodroplet Research*

Location:

University of Delaware
Trabant University Center Theatre
South College Avenue and Main Street
Newark, Delaware 19716

Information and registration at:
http://www.physics.udel.edu/~szalewic/FIsymp06
Direct inquiries to Krzysztof Szalewicz at szalewic@udel.edu