



California State University, Los Angeles

Department of Physics and Astronomy  
presents

## The Leon Pape Memorial Lecture Series

The Twenty-Fifth Annual Lecture

Why are we so excited about  
carbon nanostructures?

by

**Mildred S. Dresselhaus**  
Institute Professor of Electrical Engineering and  
Physics at MIT, President of the American  
Physical Society (1984), President of the  
American Association for the Advancement of  
Science (1997), 2008 Oliver E. Buckley  
Condensed Matter Prize recipient

October 10, 2008  
2:00 p.m.  
Physical Sciences 158

### Leon Pape



**Leon Pape** was a member of the faculty at California State University, Los Angeles from 1961 to 1971. As a professor of physics he contributed to programs and faculty development in biophysics, radiological health physics, and electron microscopy and supervised research by advanced physics and biology students. He served as University radiation safety officer, academic senator, and chair of the Department of Physics and received the campus's Outstanding Professor Award in 1968. In 1971, he joined the research faculty of the Zoophysiological Laboratory at the August Krogh Institute, University of Copenhagen, and served as director of that laboratory from 1975 to 1979. His research areas included macromolecule behavior, cell ultrastructure and function, radiobiology, energy transport, cell physiology, and physical theories of the living state. His untimely death in January 1984 prompted the establishment of this lecture series in his memory, encompassing his many interests.

### Program

**Welcome**  
Edward Rezaei, Ph.D.  
Chair, Department of Physics and Astronomy  
California State University, Los Angeles

**Introduction of Mildred S. Dresselhaus**  
James M. Rosser, Ph.D.  
President and Professor of Health Care Management  
California State University, Los Angeles

**Address**  
Mildred S. Dresselhaus  
Institute Professor of Electrical Engineering and Physics at  
MIT, President of the American Physical Society (1984),  
President of the American Association for the Advancement  
of Science (1997), 2008 Oliver E. Buckley Condensed  
Matter Prize recipient

Reception immediately following  
Golden Eagle, Ballroom Patio

### Mildred S. Dresselhaus



**Mildred Dresselhaus** has an A.B. from Hunter College (1951) and a Ph.D. from the University of Chicago (1958). After an NSF postdoctoral fellowship at Cornell University, she became a staff member at the MIT Lincoln Laboratory (1960). In 1968 she became an MIT faculty member and in 1985 an Institute Professor of Electrical Engineering and Physics at MIT. Her research over the years has covered a wide range of topics in Condensed Matter and Materials Physics. She is best known for her work on carbon science and carbon nanostructures. She is also one of the researchers responsible for the resurgence of the Thermoelectrics research field 15 years ago. She co-chaired a DOE Study on "Basic Research Needs for the Hydrogen Economy" in 2003 and more recently co-chaired a National Academy Decadal Study of Condensed Matter and Materials Physics. She served as Director of the DOE Office of Science toward the end of the Clinton Administration and as Chair of the Governing Board of the American Institute of Physics 2003-2008.

Professor Dresselhaus is a member of the National Academy of Sciences, the National Academy of Engineering, and has served as President of the American Physical Society, Treasurer of the National Academy of Sciences, President of the American Association for the Advancement of Science (A.A.S.), and on numerous advisory committees and councils. Dr. Dresselhaus has received numerous awards, including the US National Model of Science and 24 honorary doctorates. Her recent awards include the L'Oréal-UNESCO 2007 North American Laureate for Women in Science, and the 2008 recipient of the Oersted Medal for Physics Education from the American Association for Physics Teachers and of the 2008 Buckley Prize for Condensed Matter Physics from the American Physical Society.

There is much excitement about the unusual physical properties of carbon nanostructures, particularly carbon nanotubes and graphene, which are both of great interest at the present time. A brief review will be given of the physical underpinnings of carbon nanostructures that were developed over the past 50 years, starting with the electronic structure and physical properties of graphite and graphite, and then moving to graphite intercalation compounds which contained the first carbon nanostructures to be studied experimentally. Liquid carbon studies were precursors to the fullerene family of nanostructures and vapor grown carbon fibers were precursors to carbon nanotubes. Particular emphasis is given to the recent developments in our understanding of the photophysics of carbon nanotubes and graphene, with perspectives on future research directions for these fields and applications that are emerging.

### The Leon Pape Memorial Lecture Series

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| <p><b>1984</b><br/>"Radioactivity in the Service of Humanity"<br/><b>Rosalyn S. Yalow</b><br/>Nobel Laureate in Physiology or Medicine, 1977<br/>Senior Medical Investigator<br/>Veterans Administration<br/>Medical Center, New York</p> <p><b>1985</b><br/>"Science is With People: A Tribute to Leon Pape"<br/><b>Paul Seltman</b><br/>Professor of Biology, University of California, San Diego</p> <p><b>1986</b><br/>"The Dilemma of Nuclear Weapons"<br/><b>Marvin S. Goldberger</b><br/>President and Professor of Physics<br/>California Institute of Technology</p> <p><b>1987</b><br/>"How Old is the Observable Universe?"<br/><b>William A. Fowler</b><br/>Nobel Laureate in Physics, 1983<br/>Institute Professor of Physics, Emeritus<br/>California Institute of Technology</p> <p><b>1988</b><br/>"The Nature of Metals and Alloys"<br/><b>Linus Pauling</b><br/>Nobel Laureate in Chemistry, 1954<br/>Nobel Laureate in Peace, 1962<br/>Research Professor, Linus Pauling<br/>Institute of Science and Medicine</p> <p><b>1988</b><br/>"The Life of the Stars"<br/><b>Hans A. Bethe</b><br/>Nobel Laureate in Physics, 1967<br/>Professor Emeritus of Physics<br/>Cornell University</p> <p><b>1988</b><br/>"A Brief History of the First 15 Billion Years"<br/><b>Leon M. Lederman</b><br/>Nobel Laureate in Physics, 1988<br/>Director Emeritus, Fermi National<br/>Accelerator Laboratory and Professor<br/>of Physics, University of Chicago</p> | <p><b>1991</b><br/>"Visual Awareness"<br/><b>Frederic H.C. Crick</b><br/>Nobel Laureate in Physiology or Medicine, 1962<br/>J.W. Koochster Distinguished<br/>Research Professor, The Salk<br/>Institute for Biological Studies</p> <p><b>1992</b><br/>"Simplicity and Complexity"<br/><b>Murray Gell-Mann</b><br/>Nobel Laureate in Physics, 1969<br/>Robert Andrews Millikan Professor<br/>of Theoretical Physics, California<br/>Institute of Technology</p> <p><b>1993</b><br/>"The Challenge of Drug Discovery"<br/><b>Gertrude B. Elton</b><br/>Nobel Laureate in Physiology or<br/>Medicine, 1988<br/>Scientist Emerita, Burroughs<br/>Wellcome Company</p> <p><b>1994</b><br/>"Black Holes and Time Mirrors:<br/>Einstein's Challenge's Legacy"<br/><b>Kip S. Thorne</b><br/>Eyring Professor of Theoretical<br/>Physics, California Institute of<br/>Technology</p> <p><b>1995</b><br/>"Nuclear Weapons: Where Do We<br/>Go From Here?"<br/><b>Sidney D. Drell</b><br/>MacArthur Foundation Prize<br/>Fellow, 1984-1989<br/>Professor and Deputy Director<br/>Stanford Linear Accelerator Center</p> <p><b>1996</b><br/>"In Search of the Fundamental<br/>Building Blocks of Atoms"<br/><b>Samuel C.C. Ting</b><br/>Nobel Laureate in Physics, 1976<br/>Thomas Dudley Cabot Institute<br/>Professor, Massachusetts Institute<br/>of Technology</p> |
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| <p><b>1997</b><br/>"Two Atmospheric Problems: Ozone<br/>Depletion and Global Warming"<br/><b>F. Sherwood Rowland</b><br/>Nobel Laureate in Chemistry, 1995<br/>Donald Bren Research Professor<br/>of Chemistry, University of Califor-<br/>nia, Irvine</p> <p><b>1998</b><br/>"Superfluidity in Helium Three:<br/>The Discovery Through the Eyes<br/>of a Graduate Student"<br/><b>Douglas D. Osheroff</b><br/>Nobel Laureate in Physics, 1996<br/>MacArthur Foundation Prize Fellow,<br/>1981-1986<br/>Professor of Physics and Applied<br/>Physics, Stanford University</p> <p><b>1999</b><br/>"Holding onto Atoms and Molec-<br/>ules with Laser Light"<br/><b>Steven Chu</b><br/>Nobel Laureate in Physics, 1997<br/>Theodore and Frances Chaballe<br/>Professor of Physics and Applied<br/>Physics, Stanford University</p> <p><b>2000</b><br/>"Electronic Structure of Matter:<br/>Wave Functions and Density<br/>Functionals"<br/><b>Walter Kohn</b><br/>Nobel Laureate in Chemistry, 1998<br/>Professor of Physics, Emeritus,<br/>and Research Professor, University<br/>of California, Santa Barbara</p> <p><b>2001</b><br/>"Viruses: The Essence of Life, but<br/>Sneaky Critics"<br/><b>Dave Baltimore</b><br/>Nobel Laureate in Physiology or<br/>Medicine, 1975<br/>National Medal of Science<br/>Recipient, 1999<br/>President, California<br/>Institute of Technology</p> <p><b>2002</b><br/>"Freezing Time"<br/><b>Ahmed H. Zewail</b><br/>Nobel Laureate in Chemistry, 1999<br/>Linus Pauling Professor of Chemistry<br/>and Professor of Physics, Califor-<br/>nia<br/>Institute of Technology</p> | <p><b>2003</b><br/>"Light at Bicycle Speed . . . and<br/>Slower Yet"<br/><b>Leno V. Hau</b><br/>MacArthur Foundation Prize Fellow,<br/>2001-2006<br/>Greenleaf Professor of Applied<br/>Physics and Professor of Physics<br/>Lynch Laboratory Harvard University</p> <p><b>2004</b><br/>"Can Nuclear Weapons Proliferation<br/>be Stopped?"<br/><b>William K.H. Panofsky</b><br/>Professor and Director Emeritus,<br/>Stanford Linear Accelerator Center<br/>President of the American Physical<br/>Society, 1974-1975</p> <p><b>2005</b><br/>"What Can We do With a Quantum<br/>Liquid?"<br/><b>Anthony J. Leggett</b><br/>Nobel Laureate in Physics, 2003<br/>MacArthur Professor and Advanced<br/>Study Professor of Physics, University<br/>of Illinois, Urbana-Champaign</p> <p><b>2006</b><br/>"The Future of Physics"<br/><b>David J. Gross</b><br/>2004 Nobel Laureate in Physics<br/>Theoretical Physics, University of<br/>California, Santa Barbara<br/>and Frederick W. Gluck Professor<br/>of Theoretical Physics</p> <p><b>2007</b><br/>"Small Molecules: the World of<br/>Nanoscience"<br/><b>Horst L. Stormer</b><br/>1998 Nobel Laureate in Physics<br/>Isidor Isaac Rabi Professor of<br/>Physics, Columbia University, NY<br/>and Adjunct Physics Vice President<br/>Bell Labs, Lucent Technologies,<br/>Murray Hill, NJ</p> |
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