New England Section Newsletter

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Paul H. Carr & Laurence I. Gould, Co-Editors

The Joint New England Sections of The American Physical Society & The American Association of Physics Teachers Fall Meeting

October 14th & 15th, 2005

Soft Condensed Matter and Nanoscience

The University of Vermont
Department of Physics
Burlington VT 05405

The annual Fall meeting of the NES-APS will be held jointly with the NES-AAPT on the campus of the University of Vermont, Burlington VT. The APS technical program will focus on the areas of Soft Condensed Matter and Nanoscience through a series of presentations by renowned invited speakers, contributed talks, and poster sessions. The AAPT program will include presentations by expert invited speakers, contributed speakers, workshops, and poster sessions.

For updates, complete conference information including lodging, go to http://www.uvm.edu/physics or http://www.uvm.edu/physics/?Page=NEAPS/Pages/NEAPS_AAPT.html&SM=NEAPS/NEAPSsubmenu.html

Please make your overnight lodging reservations as soon as possible. October 14-15 is peak foliage season.

INVITED SPEAKERS FOR THE FALL MEETING

"How Polymer Chains Organize into Crystals"
Prof. M. Muthukumar
Polymer Science and Engineering Department
University of Massachusetts

Amherst, MA 01003

"Molecular Fluids"
Prof. Sergei S. Sheiko
Department of Chemistry
University of North Carolina at Chapel Hill

"The Physics of DNA"
Professor Rudi Podgornik,
Laboratory for Structural and Physical Biology, National Institutes of Health
and Department of Physics, University of Ljubljana, Slovenia

"Dripping, Jetting, Drops and Wetting: The Magic of Microfluidics"
Professor David A. Weitz
Physics, Harvard Univ.

"Organic Electronics"
Professor George Malliaras
Department of Materials Science and Engineering
Cornell University

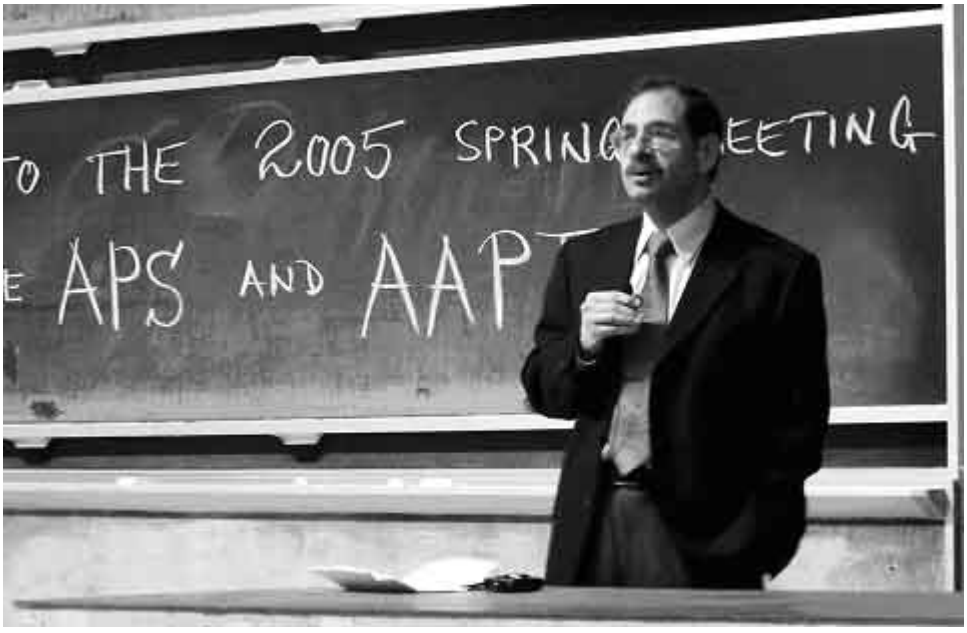
Professor Anthony Dinsmore
Physics, Univ. of Mass, Amherst.
The title of Prof. Dinsmore 's talk is: TBA

2005 Spring Meeting, Celebrating Einstein, at MIT.

The Joint New England Sections of the American Physical Society and the American Association of Physics Teachers 2005 Spring Meeting was held on Friday, April 1st and Saturday, April 2nd at the Massachusetts Institute of Technology, Cambridge, MA. MIT, which is widely recognized for its leadership in science and technology. The total attendance of 250 included 70 students.

Bill Donnelly, MIT, Meeting Chairman

Bill Donnelly, MIT, Chairman opened the meeting and Marc Kaster, Head of the Physics department, welcomed us to MIT.



Marc Kaster, Head, MIT Physics Department

PLENARY PAPERS ON APRIL 1 st

"REMINISCENCES OF PETER HAVAS" by Larry Gould, U. of Hartford, & John Stachel, BU

"BROWNIAN MOTION, AS UNDERSTOOD BY *E. COLI,"* by Howard Berg, Harvard U.

"WHEN FREEZING COLD IS NOT COLD ENOUGH…

NEW FORMS OF MATTER CLOSE TO ABSOLUTE ZERO" by Wolfgang Ketterle, MIT

Ketterle won the Nobel Prize for his observation of Bose-Einstein condensation. He observed that at nanokelvin temperatures, atoms become coherent like lasers and also exhibit wave-like interference.

"DETECTING GRAVITATIONAL WAVES" by Nergis Mavalvala, MIT

Einstein's general relativity theory predicts that gravity produces a distortion or warp in space-time. It also predicts that an accelerating aspherical or quadrupole mass will radiate gravitational waves. This is analogous to the radiation of electromagnetic waves by an accelerating charge. A gravitational wave is a propagating distortion of space-time. Mavalvala described a worldwide array of gravitational detectors. Each detector is made from a pair of mirrors, kilometers apart, positioned in a Michelson interferometer. They are attempting to detect gravitational waves from astrophysical sources such as binary neutron stars, pulsars, and coalescing compact binaries.

"TESTING ENERGY, $E = mc^2$ & WEIGHING CHEMICAL BONDS" by David Thompson, MIT

With a two-ion balance, Einstein's famous equation relating mass to energy has been verified to a part in 10,000,000.

The poster session was held in the new Stata Center

Ray Stata, founder of Analog Devices, contributed the funds for this new laboratory for computer, information, and intelligence sciences. Ray, graduated from MIT in electrical engineering in 1957, the same year that your co-editor, Paul H. Carr, graduated in physics. Ray wanted his wife's name to be included, as she supported the family after his first business failed.

Einstein's Clocks, Poincare's Maps: Empires of Time Banquet Talk by Peter Galilson, Harvard University

Banquet speaker, Peter Galison, Harvard U, presents "Einstein's

Peter Galison's banquet talk was based on his book "Einstein's Clocks, Poincare's Maps: Empires of Time." The practical need to synchronize clocks for more accurate train schedules and for the measurement of longitude led to the development of relativity. In the late 19th century, telegraphic signals sent over transoceanic cables enabled clocks to be synchronized with sufficient accuracy that the propagation delay due to the finite velocity of light had to be taken into account. Poincare, as a permanent member of the French Bureau of Longitude, was concerned about accurate maps. Einstein, while working at the Swiss patent office in Bern, reviewed patents for synchronizing clocks.

Einstein proposed a thought experiment in which lightning strikes the front and back of a train so that an observer on the station platform regards it as being simultaneous. An observer near the back of the train will not observe the strikes as simultaneous. Einstein's insight was to discard the Newtonian idea of absolute time and to view simultaneity in terms of his new theory of special relativity.

Poincare and Einstein met at scientific conferences.

Clocks" below the murals in MIT's Walker Memorial.

Poincare, who was Einstein's senior, wrote a letter recommending Einstein for a university position. Poincare said that Einstein had many bold new ideas, but if one of them is validated, it would be of great significance.

PLENARY PAPERS ON APRIL 2 nd:

GLOBAL POSITIONING SATELLITE (GPS) MEASUREMENTS by Pratap Misra, Lincoln Labs

The Global Positioning Satellite (GPS) system consists of about 24 satellites in geosynchronous orbit. A GPS receiver intercepts the coded signals from three satellites and calculates position in three-dimensional space. The receipt of a fourth signal enables the receiver to synchronize its internal clock with the GPS clock. The correction for Einstein's gravitational red shift is about 5 parts in ten billion.

THE ADVENTURE OF STUDYING EINSTEIN'S MANUSCRIPTS

Tilman Sauer, Caltech, Einstein Papers Project

Tilman Sauer highlighted three major milestones in Einstein's life.

1. 1905: His miraculous year, in which he published papers on special relativity, light quanta, and Brownian motion.
2. 1916: Publication of Einstein's theory of general relativity
3. 1919: Einstein's prediction of the bending of starlight by a gravitational field was observed during an eclipse of the sun. This made him world famous.

In accordance with Einstein's will, his original papers are at the Hebrew University in Jerusalem. The following web sites are excellent sources of information.

http://www.alberteinstein.info
http://einstein.caltech.edu

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