

New England Section Newsletter

Volume 11

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Spring 1998

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1998 Spring Meeting of the New England Sections of the American Physical Society, American Association of Physics Teachers, and Zone 1 of the Society of Physics Students

Clark University, Worcester MA
April 3 and 4, 1998

The tentative program was available for this Newsletter on January 29.

Friday afternoon:

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| 1-4 pm | registration. |
| 2-2:50 pm | demonstration by Ricardo Gonzales, senior product marketing manager at Apple Computer, on Rhapsody, Apple's new operating system. |
| 2:50-4 pm | demonstrations of Rhapsody, Linux, and software from Physics Academic Software. Coffee and refreshments served. Linux demos courtesy of the Worcester Linux Users' Group and the WPI Linux Association. |
| 4-4:10 pm | welcoming remarks, Provost Fred Greenaway. |
| 4:10 pm | Tutorial Session on Soft Condensed Matter Physics. Jerry Gollub, Haverford College and The University of Pennsylvania, "Pattern Formation, Symmetry and Chaos." Heinrich Jaeger, James Franck Institute, The University of Chicago, "The Physics of Granular Matter." |
| 6-6:30 pm | cash bar and possible poster session. |
| 6:30-8 pm | banquet on campus. |
| 8 pm | John Deutch, MIT, "Reflections on Government's Role in Research and Development." |

Saturday morning:

- 9-10:15 am** AAPT Session, Ron Thornton, Tufts University, Center for Science and Mathematics Teaching title TBA.
- 10 am-12 pm** APS Tutorial Session on Magnetism and Superconductivity.
Brian Maple, University of California, San Diego, "*Magnetic Field-Temperature Phase Diagrams of Exotic Superconductors.*"
Daniel Reich, Johns Hopkins University, "*Quantum Magnetism in Low-dimensional Systems.*"
- 11 am-12:30 pm** AAPT Session, Ruth Chabay, Carnegie-Mellon University, Center for Innovation in Learning and Department of Physics, "Teaching Mechanics and Thermal Physics."
- 12:30-2 pm** APS/AAPT Executive Committee lunch meeting.
- 1:30-3 pm** AAPT Session, Bruce Sherwood, Carnegie-Mellon University, Center for Innovation in Learning and Department of Physics "Teaching E & M."

The Meeting Committee welcomes contributed papers and posters. The deadline for APS submission is 5 pm EST on **March 27**. Meeting ID is **NES98** with full details in the February APS Meeting News. Abstract publication requires a check for \$35 to **NES/APS**.

Contacts at Clark are Sujata Davis, sdavis1@clarku.edu, and Harvey Gould, hqould@clarku.edu; for AAPT Jonathan Mitschele, St. Joseph's College, Windham ME, 207-893-7910, jmitsche@sicme.edu.

Fall 1997 Meeting at the Science Center of Hanscom Air Force Base

The 1997 Fall Meeting of the New England Section of the American Physical Society was held at the Science Center, Air Force Phillips and Rome Laboratories, Hanscom Air Force Base in Bedford MA, on Friday and Saturday, 24 and 25 October 1997.

The Friday session was on RESEARCH IN THE U.S., HANSCOM AFB, & MIT and included Mildred Dresselhaus, Institute Professor MIT, President AAAS, Harold Roth, Director at Phillips Laboratory, Horst Wittmann, Director at Rome Laboratory, R. Ralston, Associate Director at MIT Lincoln Laboratory, and Cardinal Warde, MIT.

The banquet was held Friday evening and was followed by a presentation: Creativity in Physics and Technology Transfer, with Paul Carr, moderator, A. J. Slobodnik Jr. of Rome Laboratory, and Benjamin Lax of National Magnet Lab, retired.

One Saturday session was a WORKSHOP ON PHYSICS IN INDUSTRY, What my company does. What we are looking for in a new

graduate, and included Alfredo Anderson, MIT Lincoln Laboratory, Steve Fleshler, American Superconductor Corporation, Joseph Callerame, Raytheon Company, Robert Potter, Vectron Technologies Inc. of Hudson NH, and Nicholas Jansen, M/A-COM of Lowell MA. A second Saturday session, MARKETING HIGH TECHNOLOGY, included Anthony Loumidis, Thermo Electric Corp of Waltham, and Roger Little, SPIRE Corp of Bedford.

An important feature of this meeting was its location at a government laboratory with a strong emphasis on applied science and a close connection to industrial innovation. All attendees were provided with a questionnaire, which some returned with detailed comments. The questions were: What suggestions do you have for: the future activities of the NES/APS Industrial Connection Committee? similar meetings to this Hanscom APS meeting in the future? internships for physics students in industry? changes in curriculum? skills needed by industry? other (of course)? Verbal and written responses were favorable to this type of meeting and to considerations presented by the questionnaire. The gist of the responses was that nontraditional steps should be taken for all those students who may not choose or find a traditional career or all those who have already made the choice or finding.

There was an overwhelming wealth of material and implications at this meeting, and not everyone scheduled for presentation was there to give it. It is said that the mind retains longest the first speaker and the last. I will say that Professor Dresselhaus made an impression in her talk "Current Trends in Science Policy." Since we are on the threshold of the centenary of the APS, she told us that 1948 was the centenary of the AAAS, that President Truman was present on that occasion to announce his proposal of a National Science Foundation based on Vannevar Bush's recommendations in his essay "Science, the Endless Frontier." Comments?

Fall 1998 Meeting at the University of New Hampshire in Durham NH

The fall meeting will be on October 23 and 24, 1998. On Friday afternoon there will be a session on "Advances in Condensed Matter Physics" followed by a session on "Issues in Undergraduate Education." The banquet speaker will be Daniel Kleppner on "Bose-Einstein Condensation." The Saturday morning session will be on "Advances in Nuclear Physics." At times not in conflict with talks, research labs in nuclear and condensed matter (and others) will be open to visit.

New England Section Advisor Report

The APS Council met April 19, 1997 in Washington DC.

1. President Bromley reported on a) efforts to improve cooperation among the U.S. and physics societies internationally, including hosting an informal meeting in October 97; b) work on a joint statement endorsed by 44 U.S. societies (the number was 89 by

September) to Congress in support of investment in science and technology; c) the challenging efforts to convert journals from paper to electronic publishing.

2.
 - a. Executive Officer Judy Franz reported that membership is currently at 41,000, up somewhat after three years of slight declines. A survey of members showed that the average age was increasing, and there are more retired members.
 - b. Anniversary billing is now in place, rather than the former June billing. (Note the effect this will have on our postcard reminders to APS renewers whom we invite to join the Section.)
 - c. The Forum on Physics and Society experimented with voting on Web, while retaining confidentiality. Voter participation increased from 8% to 18% and was considered a success. (Units wishing to conduct elections this way should contact Judy Franz. The software is available directly from Marc Sher at William and Mary.)
3. The APS Task Force on Careers issued a report on its recommendations, which included looking at all parts of the physics community, not only the Ph.D.'s; that an APS committee should oversee these issues; and that each physics department and national laboratory should designate a liaison for information exchange with APS.
4. Phys Rev Editor-in-chief Martin Blume reported that print journals remain extremely important despite the growing significance of on-line journals. He wants to be sure that print journals maintain their high quality, that subscription costs are held in check, and that the time interval is decreased between receipt of an article and its publication.

At present, the national origins of Phys Rev articles are 29% domestic, 34% from western Europe, 7% from Japan, and 30% from other countries.

The current strategy for electronic publishing is to a) put the print version on line; b) arrange worldwide distribution via mirroring and pipelines; c) enhance capabilities of electronic versions, such as linking Phys Rev to other journals and preprint archives, or accepting "enhanced articles" that could include color, sound and video; d) put Phys Rev on line back to its inception of 1893 (Blume is working with NRL and Los Alamos on a proposal to NSF); and e) figure out a way to charge for all this.

At this point in the meeting, Judy Franz proposed a new APS/AIP "highlights" journal to occupy a position between research journals and magazines. There might be five articles per week in one- page versions that would link to the whole articles. The purpose would be to benefit the scientist who is not expert in those fields.

5. The Publications Oversight Committee recommended that all journals be available electronically in fiscal year 1998. Online

journals will cost \$25 for members; CD ROM's will be \$25 per disk for members.

6. The APS Council endorsed a statement on the Comprehensive Test Ban Treaty approved by the United Nations and signed by the United States, that urges the Senate to ratify it at the earliest possible date.
7. The APS Council approved a statement urging the U.S. government to proceed rapidly with the development of national reactor and spallation neutron facilities. (Some other countries are superior to us in these capabilities.)
8. APS expressed concern over proposed legislation and treaties that would impose, through copyrighting of data bases (generated using public funds), severe restrictions upon the fair use of scientific data (for example, the sale of Landsat images between 1985 and 1992, before it was realized that they had become unaffordable for environmental research). (Private companies "own and sell" data that might properly belong in the public domain for non-profit uses.)
9. Treasurer Tom McIlrath reported that the proposed FY98 budget is conservative and balanced. The Council approved the budget.
10. The Campaign for Physics, a joint AAPT/APS effort, has nearly reached its 5M\$ goal.
11. A preamble to the Objective of APS was approved so it now reads "In the firm belief that an understanding of the nature of the physical universe will be of benefit to all humanity, the Society shall have as its objective the advancement and diffusion of the knowledge of physics."
12. Memorial resolutions for Edward Purcell, Heinz Barschall, and Chien-Shiung Wu were approved.
13. A new geographical section was approved, the Four Corners Section, that will include members from Arizona, Colorado, New Mexico, and Utah.
14. Planning for the APS Centenary continues. The major celebration will take place March 20- 26, 1999 in Atlanta Georgia. The meeting will be considered a general meeting combining the March and Spring meetings, and includes participation of AAPT. Brian Schwartz will meet with section representatives in November. Sherrie Preische and Brian have met with Coca Cola (for outreach to local schools), with Morehead University President Walter Massey (a well-known physicist), with the Fernbank Museum of Natural History, which may do a physics-related exhibit, and with the journalism program at Emory University, which plans a symposium on science writing. Plans are underway for a special issue of Reviews of Modern Physics in 1999. Disney World's Epcot Center has expressed interest in a long-term relationship with APS, including the Centenary. Guy Emery is our Section liaison to the Centenary Committee.

There is a centenary web page, which can be accessed via the APS home page.

(At the April 97 APS Executive Board meeting, Judy Franz suggested that an APS task force be formed to examine Physics Today and decide how well it meets APS members' needs. At its September meeting, she reported that Burton Richter had agreed to chair it. Jack Pribram is one of the members of the task force.)

Editor: This concludes the report given by Jack Pribram of Bates College to the Executive Committee of the New England Section at the fall meeting at Hanscom. Jack was to end his service as Section Advisor at the end of 97. Thus we are to have a new Advisor.

News from the University of Massachusetts System

In the June 1997 Physics Today, on page 74, appeared an article entitled "Physics Programs Threatened by Productivity Review in Massachusetts." Newspapers in Massachusetts and Connecticut carried the report. Small programs of high quality were placed in danger. This has implications for similar programs around the country. In response to my query for information, two readers of the Newsletter confirmed the essence of the proposal by the Mass. Board of Higher Education. Any department in the UMass system averaging fewer than five graduates per year is a candidate for elimination. Some major subjects, perhaps physics, would not be pursued at every campus, but only at campuses that had the numbers. Enid Sichel of MIT told me that the physics department at UMass/Dartmouth was moved from the College of Arts and Sciences to the College of Engineering.

I received a detailed and very upbeat update on the situation from Paul Ukleja, the Chair of the Physics Department at UMass/Dartmouth. The steps the department took can be extended to other programs needing a boost. First of all, it is true that physics programs were threatened but were not closed down. Some other programs were cut at State College and University campuses, showing that the threat was not empty. It is also true that a number of the campuses still are averaging fewer than five graduates in physics per year.

But UMass/Dartmouth is experiencing a healthy growth spurt in physics. While maintaining their average of a dozen or more MS graduates per year (apparently tops in awarding the MS among some eighty MS institutions in the U.S.), they have grown to their maximum ever in overall numbers of physics majors and minors, with 26 in the four years of the BS program and 9 minors (a few months ago). As an example, the junior Quantum Mechanics course enrolled 18, about 50% above the previous high. This means that the 1999 graduating class should reach double figures in physics BS degrees for the first time, a figure to be envied by many colleges and universities that have suffered large decreases in physics majors.

I think the recruitment of minors was most inspired. I quote from Professor Ukleja's letter: "The increase in minors was a very

cost-effective and an easy way to get increased enrollments in the upper level classes. Our average of the previous twenty years was only 0.5 minors! Last year, I made a simple handout which listed the minor and asked professors to announce it to the introductory level classes, where we 'incarcerate' the engineering and science majors for several semesters. As a result, we went from 1 minor at this time last year to our present 9, all of whom are juniors or seniors and take 3 or more upper level courses over the space of 2-4 semesters."

The UMass/Dartmouth physics department is at a major crossroad. In recent years four tenured faculty retired (out of 13). They were replaced partly by part-time instructors and a full-time visiting lecturer. In the past year the department hired two physical oceanographers, who have joint appointments with CMAST, the Center for Marine Science and Technology, and have opened a new lab in New Bedford. The physics department hopes to begin getting BS and MS students with interests in "ocean physics." It looks like a very novel field, that is not widespread, and could have a bright future. Like other new fields, it is still being created. I (the editor) can't even say what ocean physics is with any degree of certainty.

By 1999 (Ukleja reports) 4-6 more faculty are likely to retire, so there will be a rather drastic transformation in the makeup of the department in a short time. But they have plans to maintain quality, including strength in service courses, in outreach to the community and to teachers, and in caring for students. Ukleja is optimistic and I (DM) wish them the deserved best of luck.

News from the University of Connecticut System

The news is amazingly good, particularly in view of the bad news in Massachusetts of last year, described on the preceding page. Governor Rowland and the state legislature have continued to support a much-needed but costly initiative called UConn 2000. Perhaps a billion dollars will be spent in total in this decade and the next on capital improvements. The Storrs location (the main campus) has a new chemistry building that may be visible from space and a convenient parking garage. We will have a new biology/physics building. There will be new dormitories and new structures in fine arts, including an additional music building. These are accompanied by improvements to the older buildings, which are still used and useful. The Stamford location (a branch) has a magnificent new campus in downtown Stamford. It is expected to have many more students, more four-year programs, and a thriving MBA of much wider appeal than at the former attractive but small and less accessible campus. The CSU system is not being neglected. The four campuses in New Britain (Central), Willimantic (Eastern), New Haven (Southern), and Danbury (Western) are seeing building, but not to the extent of UConn.

There is money and enthusiasm available for the activities to go on in the buildings as well as for the buildings themselves. Norman Hascoe is a great benefactor of science at the University of Connecticut. Among the many benefits of his endowment is a series called "Frontiers in Science

Lectures." It began last semester with two lectures. The lectures are aimed at advanced undergraduate science students, but, as we know, basic understanding is provided to graduate students and faculty when the most technical details are omitted in favor of concepts. The theme, as stated in the announcement, was "nanoscale science, the science of things with dimensions less than one hundredth the width of a human hair." On November 3, Wolfgang Ketterle of MIT spoke on "Matter Made of Matter Waves: Bose-Einstein Condensation and the Atom Laser." On December 1, Paul Alivisatos of UCal/Berkeley spoke on "Semiconductor Nanocrystals: New Materials Through Control of Size." Other series on other themes will be presented in future.

The Storrs campus has some new programs, with which I would like to acquaint readers. Possibly other physics departments will have the capabilities and interests to do something similar. The UConn Advance, the administration's newspaper, carried in-depth articles and can be visited on the Web at www.news.uconn.edu. This paper comes out roughly weekly during semesters and gives news and comment (admittedly, with a certain slant I usually do not share). On October 6, 1997, Vol. 16, No. 5, page 5, find the title "Research solves problems from Mars to crime scenes." Jeffrey Schweitzer is a research professor who recently joined UConn's physics department to do nuclear astrophysics. Additionally, he is part of a team of scientists working with the National Institute of Justice to apply the technology used by NASA in space exploration to fight crime. Schweitzer spent two decades at Schlumberger developing innovative sensing devices to locate fossil fuels. His talent for making small, light, sensitive instruments led him to NASA's NEAR (Near Earth Asteroid Rendezvous) mission and in turn to a newer venture in forensic science, at first by request of the FBI investigating possible building fraud. It makes a fascinating story. If you want it, I can send you a copy of this Advance article or the next (below).

On October 21, 1997, Vol. 16, No. 7, page 4, find the title "New course blends science and music." The course is "The Physics of Music," a four-credit laboratory science course created and taught by George Gibson, a laser physicist and possible concert pianist (if he had lots of time to practice). He uses sound waves and mechanical vibrations to enter wider realms of physics. The most novel feature is that students or student-teams build their own functioning instruments, which emit noise, music (if lucky), nothing (if unlucky). Very educational.

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THE LAST BANG

It is almost the centennial of the American Physical Society. Millenium nearly approacheth. But I worry that we don't truly know how to celebrate. No, I don't mean with funny hats and balloons, like a political convention that has nominated the latest fool to run for office. (There could be a nice flag and slogan: Don't Flip My Spin.) I mean something much more in the guts than that.

It's true that we have the traditions and the doctrines, and we are people of the book (electronic books, now). What we don't have, yet, is the mythology. Where is the mythic hero who died for us and is reborn? The first candidate you think of is Galileo. On the outs with the somewhat corrupt traditional religionists, he established his own belief system, which cost him plenty. The next important prophet, Newton, named his predecessor the shoulders of a giant. Several centuries later Galileo was resurrected by the church that had condemned him. Much more of his life would need to be fantasized after the fact, circumstances of his birth and death, for example. Trouble is, he is too recent and too well-known. We cannot suspend data.

I have in mind sanctifying Schrodinger's cat. Not born of woman, he (could be she or perhaps a superposition) might be considered a surgeon birth, his inventor wielding the forceps. But he died a-borning in a sense, Schrodinger's idea being to ridicule the ascendant (now standard) interpretation of quantum mechanics, which regarded the cat as neither alive nor dead. But we know now he is alive and maybe well and living in Paris and Cambridge and Boulder and other neat places. He is a Rydberg atom in superposed states; call them "dead," "alive," or what you will, for they are just words until you do the experiment that makes the words flesh. As many people are seeing The Cat on their screens as are seeing Elvis at their malls. The Cat is King.

I don't know of ceremonies we could perform to properly laud our hero,

besides adopt-a-cat. Perhaps we could accept a substitute. My personal favorite is Richard Feynman, and I would be willing to lead a pilgrimage from the Bronx High School of Science to Cal Tech, touching "Stations of the Spherical Cow" along the way at Cornell and Los Alamos.

The Coke-is-it Walt Disney Physics Centennial suggests to me many other enhancement devices we might try, ones that work well in other contexts. How about theme parties and theme parks? We could do free fall without bungee cords, once each. A partial list follows of further ideas. Physics marathon, 26 miles covered while lecturing. Physics merit badges, better than grades. Physics slam, must be dramatic, preferably in rhyme. Physics minus one, so YOU can propose pairing to B and S. Physics lite, official science of the Super Bowl. Physics 2000, your choice. Physics awareness month, a brand new culture to most. Physics noir, the way Bogie would do it. Physics after dark, very jazzy. The million physicist march. A sacred physics rock, maybe from Mars. Extreme or high impact physics. A Physics Home Companion.

Schrodinger's cat is taking a rest. With enviable coolness he has been blessed. What goes through his mind cannot be guessed. It might be a theorem, it might be a jest. He looks out his window and what does he see? The mosquito coast or snow on a tree. A mountain top or a Floriday key. A Siamese kitten or an image of me. Everything happens to him at once. A careful move or a sequence of stunts.

This is a test of Schrodinger's cat at the behest of Schrodinger's cat. You've seen the best of Schrodinger's cat. What's left is the rest of Schrodinger's cat.

PDQ

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