Alan Guth to give the 11th Annual Robert Hofstadter Memorial Lectures

We are extremely pleased to announce that the annual Robert Hofstadter Memorial Lectures have been scheduled for January 27 and 28, 2003 (see below). Both lectures will be held at Stanford University, and we hope that you will save these dates on your calendars. This year we are honored that our distinguished lecturer will be Alan Guth, the Victor Weisskopf Professor of Physics at MIT, and the co-recipient (along with Andrei Linde and Paul Steinhardt) of this year’s Dirac Medal. Prof. Guth’s research interests are in the area of elementary particle theory and the application of particle theory to the early universe. He is the originator of the theory of cosmic inflation and the author of the recent popular book, “The Inflationary Universe: The Quest for a new Theory of Cosmic Origins” (1998). In addition to receiving many distinguished academic awards, Newsweek magazine has called Guth one of “The 25 Top American Innovators,” and Science Digest has ranked him among the “100 Brightest Scientists Under 40”. We are sure that he will give outstanding lectures that you will not want to miss!

EVENING PUBLIC LECTURE

(8:00 pm – Monday, Jan. 27, 2003)

COSMIC INFLATION and the ACCELERATING UNIVERSE

Inflationary cosmology offers possible explanations for many features of our universe, including its uniformity, its mass density, and the faint ripples that are now being observed in the cosmic background radiation. The recently discovered acceleration of the universe has radically altered our picture of the universe, but has also helped to confirm the basic predictions of inflation.

AFTERNOON COLLOQUIUM

(4:15 pm – Tuesday, Jan. 28, 2003)

TIME TRAVEL and COSMIC STRINGS: A PLAYGROUND for THEORETICAL PHYSICISTS

Does general relativity allow spacetime to become so twisted that a space traveler can return to her own past? Maybe. A decade ago Richard Gott showed how to build a time machine using two infinitely long straight cosmic strings. This construction is so simple and elegant that no one can avoid being fascinated by it. Guth will describe the construction, and discuss some of the mechanisms that nature seems to use to prevent time machines from happening in the real world.

Both lectures will be held on campus in our Teaching Facility on Serra Street (TCSEQ, Room 201). If you have further questions, please contact us by telephone: (650) 723-4347, fax: (650) 723-1821 or email: tice@stanford.edu. We hope you’ll plan to join us for these exciting talks.

Happy New Year! I am extremely pleased to report that the Physics Department has made an outstanding new faculty appointment. Mark Kasevich, who was an Assistant Professor of Physics at Stanford University from 1992 until 1997 (when he left to take a faculty position at Yale) has rejoined our faculty. Mark is an experimental physicist in the field of atomic, molecular and optical (AMO) physics. He has had remarkable success thus far in his career and has earned a worldwide reputation as an expert in the field. He has brought consider-
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able strength to our department, revitalizing the AMO group. We feel very fortunate to have Mark as a colleague again, and look forward to working with him for many years to come.

Our work with SLAC on the search for a Director of the new Institute for Particle Astrophysics and Cosmology is winding up, and we should have exciting news to report very soon. We have high hopes for the future of this new Institute, which should create wonderful new opportunities for the Stanford physics community.

We are happy to report that our faculty have received a number of recent awards. Andrei Linde, along with Alan Guth of MIT and Paul Steinhardt of Princeton, was awarded the prestigious 2002 Dirac Medal and Prize from the International Centre for Theoretical Physics. They were chosen for the 2002 Dirac Prize for the development of the concept of inflation in cosmology (see article on page 5). Mark Kasevich was awarded the I. I. Rabi Prize from the American Physical Society “for developing atom interferometer inertial sensors with unprecedented precision, and for pioneering studies of Bose-Einstein condensates, especially the achievement of non-classical spin states and the demonstration of a mode-locked atom laser.” The Rabi Prize recognizes outstanding research in atomic, molecular and optical physics by investigators who have held a doctorate for ten years or less. Another award went to David Goldhaber-Gordon, who received the William L. McMillan Award for outstanding contributions in condensed matter physics by a young researcher. This award consists of a $1,000 prize, a plaque, and an invited lecture at the University of Illinois at Urbana-Champaign. Also this past year, Hari Manoharan was selected as one of two PECASE Awards (Presidential Early Career Award for Scientists and Engineers). Hari was also the recipient of a Young Investigator Award and a Sloan Research Fellowship.

We are also excited about this year’s Robert Hofstadter Memorial lectures, which will be given by Alan Guth, the Victor Weisskopf Professor of Physics at the Massachusetts Institute of Technology. Prof. Guth’s research interests are in the area of elementary particle theory and the application of particle theory to the early universe. The lectures will once again be held at Stanford University on January 27 and 28, 2003 in the Teaching Center (TCSEQ), Room 201.

A diverse new group of twenty-four students entered our Ph.D. program in 2002. The incoming graduate students include three women and twelve foreign students. One of our new graduate students has an NSF Fellowship and three have Stanford Graduate Fellowships. We are very pleased to welcome these new students to our department.

Finally, I want to thank all of you who have made donations to the Physics Department over the past year. Your contributions have created many worthwhile opportunities and events for our students and for the larger physics community. On behalf of everyone in the department, I thank you for your continued support and interest.

With our very best wishes for 2003,

Douglas Osheroff
Chair and Professor of Physics

Brent Young joins Physics Staff

This past fall, Brent Young joined the Physics Department as a Senior Research Scientist, working with Prof. Mark Kasevich. Brent earned his Ph.D. from Stanford in 1997, working in Steve Chu’s research group. Since receiving his Ph.D., Brent spent two years at NIST in Boulder, Colorado as a postdoc, two years at JPL as a member of the technical staff, and a year at Yale, as a Research Scientist. At Stanford, he continues his work as the lead program scientist for the airborne gravity gradiometer program. We welcome Brent back to the Physics Department in this new role.

Commencement 2002

Sixteen students received their Bachelor’s degree in Physics at our graduation ceremony on June 16, 2002. Four of those students graduated with Honors, three with Distinction, and two Phi Beta Kappa. Bill Falsey was the undergraduate student speaker for Physics, and the Physics graduate student speakers were Tim Meyer and Harris Shapiro. Eleven students received their doctoral degree in Physics, and a number of student awards were announced: Jamie McGuire and Stirling Churchman were co-recipients of the Paul Kirkpatrick Award, given to the outstanding physics teaching assistant. The David Levine Award, given to the outstanding Junior Physics major, was awarded to Joel Hartman and Ee Hou Yong. The Jeffrey Willic Memorial Award, given to an outstanding physics student in the field of astronomy, was presented to Colin Bischoff. Lastly, Polly Fordyce, George Marcus and Neil Rubin were the recipients of Centennial Teaching Awards. Our congratulations to the class of 2002!
Result from the first six months of experiments at KamLAND, an underground neutrino detector in central Japan, show that anti-neutrinos emanating from nearby nuclear reactors are “disappearing,” which indicates that they have mass and can oscillate, or change from one type to another. The KamLAND detector (as reported on in our 2001 newsletter) was built and is operated by a Japan-US-China team, including the group led by Prof. Gratta at Stanford.

Over the last 35 years, physicists have managed to detect neutrinos produced by nuclear reactions in the sun, but at the same time they have discovered that the flux of neutrinos observed is substantially lower than the one expected from the models that describe the solar cycle. More data from an array of solar neutrino detectors has consolidated the idea that the “puzzle of the missing solar neutrinos” is not related to the working of the sun, but, rather, it is the effect of the property of neutrinos to “oscillate” from one type to another in their propagation from the sun to the earth. Now KamLAND has measured the same oscillation with man-made (anti)neutrinos produced on the earth by nuclear power plants. The fact that we can reproduce all of this in the lab is the first clear demonstration that we really understand the phenomenon. It is a bit like thinking of an astronomer of 100 years ago who first detects spectral lines in starlight. The world does not know of quantum mechanics and atomic physics and a controversy begins in the community of scientists: Are the spectral lines a property of the stars or are they a property of light and atoms?

More astronomical observations seem to show that the second hypothesis is the right one, but then someone in a lab sets up an arc lamp and observes the same lines from it. At that point, everyone finally agrees that the lines are properties of atoms and the light they emit! A similar scenario has happened with neutrinos from the Sun: KamLAND has reproduced the effect in the lab and we are now sure that neutrinos undergo oscillations, no matter who is emitting them.

The fact that we are now sure neutrinos have a finite mass means we can try to measure it, because oscillations only measure the mass difference between neutrino types and not the absolute mass value. One of the most sensitive and challenging experiments to measure these masses,
Anyone who received an undergraduate degree or was a TA in the Stanford Physics Department at anytime since the early 1970’s, undoubtedly knows Dr. Martin LaPointe, who managed our Introductory labs for over 30 years. Martin retired in early January 2003, and his presence is sorely missed in the Physics Department.

A dedicated experimentalist and self-described “born gad-geteer,” Martin came to Stanford from the University of Maryland in 1971, joining Fred Thorne and Frank Benes on the undergraduate lab staff. He became interested in teaching while still a graduate student at the University of Michigan, where he was an Instructor for the lab courses during his final year in school. After receiving his Ph.D. from Michigan, working under Wayne Hazen on cosmic ray air showers (“The Core Structure of Extensive Air Showers”), Martin joined MIT’s Extensive Air Shower collaboration as MIT’s principal scientist at the Laboratorio de Fisica Cosmica in Bolivia. Martin’s duties included running the experimental hardware detector located at 5200m on Mt. Chacaltaya, designing and building the next generation detector, and directing the data analysis. He then moved on to a faculty position at Maryland along with the Air Shower program, where he became the PI for the program.

At Maryland, Martin also began teaching, both theoretical mechanics and undergraduate labs. His responsibilities included both introductory labs and developing an advanced modern physics lab where he applied his expertise in instrumentation. When the Stanford position opened, Martin was ready for California, a major change from Ann Arbor, College Park.

While generations of students have passed through Martin’s labs, he also became an invaluable resource for the entire department, with his 30 years of historical knowledge and institutional memory. He worked in innumerable ways, large and small, to support the department in its educational and research missions. Always available for student projects, TA demonstrations, equipment loans, local school outreach, running the Explorama, ensuring that useful archives are saved during recent years of space contraction, Martin’s influence in the department will be felt for years to come.

A retirement celebration was held on January 9, 2003 in the Faculty Club, attended by many of Martin’s friends and family. We all miss Martin and wish him continued success in the next phase of his life.

Gregory Romine joined the Physics Department in September, 2002 as the new Introductory Laboratory Manager; he took over for Martin LaPointe, who retired in January. Mr. Romine’s previous position was at Indiana University-Purdue University, Indianapolis (IUPUI), where he was a Physics Lecturer. He was responsible for course development, design, implementation and teaching of student labs and lecture demonstrations. He authored the text, “Applied Physics, Concepts into Practice,” as well as an accompanying lab manual, for an introductory physics sequence for technology students. Mr. Romine is the recipient of an Outstanding Part Time Lecturer Award of the School of Science, and the Chancellor’s Part Time Instructor Award from IUPUI. He brings a wealth of experience to Stanford, and we are very pleased to have him on our staff.
Professor Andrei Linde was named co-recipient of the 2002 Dirac Medal by the Abdus Salam International Center for Theoretical Physics (ICTP) in Trieste, Italy. Prof. Linde shares the prize with physicists Alan Guth of MIT (this year’s Hofstadter lecturer; see article on page 1) and Paul Steinhardt of Princeton University. The ICTP officials credited the three physicists with developing the concept of “inflationary cosmology” — the idea that the universe began not with a fiery big bang, but with the rapid expansion of space in a vacuum-like state. Linde’s work at both the Lebedev Physical Institute in Russia, and later, here at Stanford, helped lay the foundation for inflationary cosmology.

The Dirac Medal has been awarded annually since 1985 to individuals who have made significant contributions to theoretical physics and mathematics. The Medal is given in honor of P.A.M. Dirac, one of the great physicists of the 20th century. Previous winners include theoretical physicist Helen Quinn, a Professor at SLAC. Linde, Guth and Steinhardt will receive medals and a shared $5,000 prize, and present lectures in Trieste next August.

Andrei Linde Receives 2002 Dirac Medal

Prof. Andrei Linde

Physics Student Places 2nd in National Physics Competition

We are pleased to report that Physics undergraduate student Xinan Wu placed second in the annual Boston Area Undergraduate Physics competition. The BAUPC is a national competition sponsored and organized by the Harvard University Physics Department in the spirit of a “physics olympiad.” Participants are given a series of physics questions to be answered within a 4 hour time limit. Last summer there were 75 participants, from Caltech, Harvard, MIT, Princeton, Stanford, UC Berkeley, UC Santa Barbara, Worcester Polytechnic Institute and Mt. Holyoke College. Of the 75 competitors, Xinan placed second, and Stanford as a group placed fourth. Congratulations to Xinan Wu for this impressive showing!

Ronald Kantor


Ronald Kantor, a former Stanford Physics graduate student who received his Ph.D. in 1992, died on July 3, 2002. He had contracted a rare autoimmune disease, and he passed away after a valiant fight. Ron is survived by his mother, Mrs. Evelyn Kantor. He is remembered fondly by his friends in the Physics Department as a very bright and ambitious student. Ron was an attorney with the law firm of Howrey Simon Arnold and White in Menlo Park, California. The firm does a great deal of patent and anti-trust work, often involving scientific matters. Ron was a much-valued member of the firm who brought his scientific mind to bear on legal issues. Recently, his firm established The Howrey Term Endowment Fund in Memory of Ron Kantor. This fund will be expended over a period of ten years, and will help support graduate students in the Physics Department. We are most appreciative of the establishment of this fund, which will help Stanford physics students and honor Ron Kantor’s memory. Should you wish to contribute to the fund, you may send a donation to: Dept. of Physics, Stanford University, Stanford, CA 94305-4060 (endorse to the Dept. of Physics and note R. Kantor fund in the memo portion of your check).
Irv Lachow (BS, 1989) recently joined Booz Allen Hamilton as a Senior Associate. He is deputy director of the firm’s eMilitary practice, which applies emerging technologies and best business practices to Department of Defense clients. Since graduating in 1989, Irv received a Ph.D. in Engineering and Public Policy from Carnegie Mellon University, attended Harvard on a CSIA Fellowship, worked for the RAND Corporation, and received a Defense Policy Fellowship from the AAAS.


Peter D. Zimmerman (BS, 1963, Ph.D., 1969) served as the Chief Scientist of the Arms Control and Disarmament Agency during the Clinton Administration and, once ACDA was merged into the State Department, as the Science Adviser for Arms Control. He later moved to the Majority Staff of the U.S. Senate Committee on Foreign Relations as Chief Scientist. He coordinated two days of hearings on the threat to our national security posed by radiological weapons and improvised nuclear explosives. Peter is also serving as the APS Councilor from the Forum on Education, and was Chair of the Forum on Physics and Society.

Here are updates on the Physics alumni who responded to our inquiry in last year’s newsletter. We’d like to hear from more of you! Please send us news about yourself to the following email: tice@stanford.edu. Include your address and information about your current employment and interests.

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EXO, is being built by a consortium also led by Gratta’s group at Stanford. This experiment will employ up to 10 tons of the isotope Xe-136, separated from the other Xenon isotopes, and a detector that will borrow techniques from atomic and nuclear physics to reach neutrino mass sensitivities of about 10 meV.

For additional information on the KamLAND experiment, please see the website: http://hep.stanford.edu/neutrino/KamLAND/KamLAND.html