The University of Connecticut

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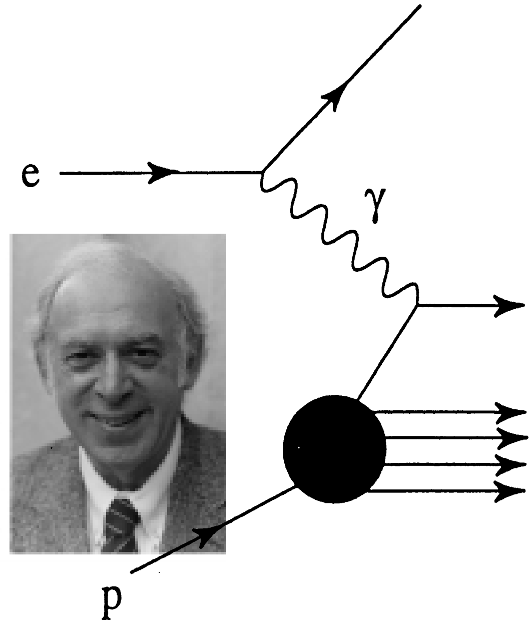


New Horizons In Particle Physics

Jerome Friedman, Katzenstein Distinguished Lecturer
Friday, October 13, 2000

Great progress was made in particle physics in the second half of the twentieth century, driven by the development of new types of accelerators and particle detectors. The combination of extensive experimental results and new theoretical insights led to the quark model, Quantum Chromodynamics, and Electroweak Unification. These advances form the basis of a remarkably successful theory of elementary particles, the Standard Model. Although its predictions have been confirmed with good precision at present accelerator energies, this theory cannot be reliably extrapolated to the TeV energy region. Questions about spontaneous symmetry breaking and supersymmetry must be answered before there is a more complete quantitative description of the physics at higher energies. Experimental programs are being prepared in the US and abroad to resolve these and other issues.

Jerome Friedman is an experimental particle physicist whose research has included studies of particle structure and interactions with high energy electrons, neutrinos, and hadrons. His work was carried out at a number of laboratories: the Cambridge Electron Accelerator, the Stanford Linear Accelerator Center (SLAC), and Fermilab.

He received, jointly with Henry Kendall and Richard Taylor, the Nobel Prize in Physics in 1990 and the W.H.K. Panofsky Prize in 1989 for the experimental discovery of quarks. This work was done at SLAC where a high energy electron beam was used to probe the insides of the proton and neutron, much like using a very high magnification electron microscope. He also received the Alumni Medal of the University of Chicago, where he earned his physics degrees.

In 1960 he joined MIT as an assistant professor and he became Professor in 1967. At MIT he has served as Director of the Laboratory for Nuclear Science and Head of the Physics Department. In 1991 he was elevated to Institute Professor. He is a member of the National Academy of Sciences and the American Academy of Arts and Sciences, and is a Fellow of the American Physical Society and the American Association for the Advancement of Science.

Professor Friedman is a statesman of science in the national and international communities. For example, he served as Vice-Chairman of the Board of the University Research Association and as a member of the Board of Physics and Astronomy of the National Research Council. He is Past President of the American Physical Society and Chair Elect of the Council of Scientific Society Presidents, an organization that represents over sixty scientific and science education societies. He is also a member of the Scientific Policy Committee of CERN and of the Council of the High Energy Accelerator Research Organization of Japan.

The Katzenstein Distinguished Lecture Series is made possible through the generosity of Henry and Connie Katzenstein. Henry Katzenstein was the University of Connecticut's first Ph.D. in physics and he established an endowment for this lecture, as well as for an annual prize for undergraduate research. Recently the Katzensteins have added generously to this endowment. Faculty and alumni contributions have also increased the endowment by more than $50,000.

Charles A. Reynolds Lecture

The lecture series is dedicated to the memory of Charles A. Reynolds, professor in this department from 1952 until his death in 1971.

In the abstract of the lecture of March 10, 2000, Professor Chu wrote: (high temperature superconductivity) reveals physics that defies predictions by conventional theories of solids. Interestingly, this statement would have applied to all of superconductivity just before 1950.

Charles Reynolds, who came out of the low temperature group at Yale, was then working at Rutgers with Bernard Serin and others. The group found that the transition temperature and the threshold magnetic field of mercury varied with average isotopic mass. They showed that the free energy of the phase change varied inversely to that mass. This result stirred the low temperature community, since it meant that the lowering of the free energy is due to electronic interaction with phonons. The group at Rutgers found results in other metals were consistent with their original findings.

Charles Reynolds came to the University of Connecticut in 1952, where he built up his low temperature laboratory, not an easy task under then current funding and support. At the same time he used his cryogenic experience at the Brookhaven National Laboratory. The thrust of his research at UConn was superconductivity and transport in single crystals of tin and cadmium. From precise measurements of the transition temperature he deduced the residual resistivity, and he was thus able to compare the electrical and thermal conductivities of specimens of different orientation. This was a powerful method to study anisotropic conduction.

Low temperature colleagues around the world first heard of the University of Connecticut because of the publishing of Chuck Reynolds. His presence helped stimulate others to come to UConn. Paul Klemens, the noted solid state theorist, came from industry to be department head in 1967 and provided a spur to further low temperature experiments. Charles Reynolds was still a relatively young man when he died. He died much too soon and has been badly missed by his many friends, colleagues and students.

Paul Chu Presents 2000 Reynolds Lecture

The year 2000 Reynolds lecture was presented by Paul Chu, Director of the Texas Center for Superconductivity at the University of Houston and holder of the T.L.L. Temple Chair of Science. Professor Chu and his colleagues were the first to synthesize and identify a high temperature superconductor with a transition temperature of 93 Kelvin (significantly above the boiling point of liquid nitrogen - a relatively low cost refrigerant). Professor Chu has a distinguished record of accomplishments in the field of superconductivity and it was most appropriate for him to present a Reynolds lecture commemorating Professor Charles Reynolds, who was closely associated with the isotope dependence of the transition temperature.

Professor Chu is well recognized for his contributions. He has been elected a member of the National Academy of Sciences, the American Academy of Arts and Sciences, the Chinese Academy of Sciences (Beijing), the Academia Sinica (Taipei), the Third World Academy of Sciences, and is a Fellow of the American Physical Society and the Texas Academy of Sciences. He has received honorary doctorates from Northwestern University, Fordham University, The Chinese University of Hong Kong, Florida International University, The State University of New York at Farmingdale, Hong Kong Baptist University, and Whittier College. In 1990 he was selected the Best Researcher in the U.S. by *U.S. News and World Reports*. He has received numerous awards, including the National Medal of Science, the International Prize for New Materials, the Comstock Award, Texas Instruments' Founders' Prize, the Leroy Randal Grumman Medal, the World Cultural Council Medal of Scientific Merit, the New York Academy of Sciences' Physical and Mathematical Science Award, the Bernd Matthias Prize (M^2S-HTSC), and the Award of Excellence in Scientific Accomplishments (World Congress on Superconductivity).

In his lecture Professor Chu reviewed the history of the discovery of superconductivity by Kammerlingh Onnes in 1908 and the identification of the Meissner effect some twenty years later by Meissner and Ochsenfeld. The importance of high pressure studies on the first high Tc compound was stressed as indicating a path to the synthesis and identification of a new compound $YBa_2Cu_3O_7$ which superconducts at 93 K.

Recent high pressure studies on Hg containing planar structure Cu-O compounds have enabled his group to produce transition temperatures as high as 160 K. Professor Chu summarized the present status of theory in the attempt to provide a mechanism for these high transition temperature materials. A number of applications which indicate substantial promise and benefit were also discussed, including recent studies of superconducting quantum interference devices in studies of heart behavior (magnetocardiography).

Towards the end of his talk, he discussed newly discovered compounds such as $GdRuSr_2CuO_8$, which undergoes both a magnetic transition at about 130 K followed by a superconducting transition at a temperature which at present is below 30 K. It is believed that the magnetic order is driven by the Ru-O subsystem of the structure while the superconductivity appears to arise in the Cu-O planes. Professor Chu dedicated his talk to Professor Joseph Budnick who had been his advisor at Fordham University for his master's studies - and during his lecture shared with us a photo of his graduation from Fordham. While visiting UConn, Professor Chu also led two informal lunch time discussions - one with about fourteen faculty and the second with eighteen to twenty students. Both sessions, as well as his lecture and the discussion that followed, were very lively and well appreciated by all.

The Norman Hascoe Lectures on the Frontiers of Science

The Department of Physics has continued to play a leading role in a new lecture series funded by Mr. Norman Hascoe of Greenwich, Connecticut, aimed at exciting undergraduates with scientific interests in frontier areas of science. Each lecture is open to the public and is followed by a reception and an informal panel discussion. In our third year, we had six outstanding lectures in the general field of nanoscale science:

1. **Phil Bucksbaum**, University of Michigan, "Quantum Wave Packet Sculpting"
2. **Daniel James**, Los Alamos National Lab, "Quantum Computing"
3. **James Heath**, University of California - Los Angeles, "Computing Elements at the Molecular Level"
4. **Dick Slusher**, AT&T Bell Labs, "Photonics Bandgap Lasers"
5. **Dennis Deppe**, University of Texas - Austin, "Semiconductor Microcavities and Lasers Based on Quantum Dots"
6. **David Deamer**, University of California - Santa Cruz, "Nanoscale Sequencing Technology "

Nanoscale science involves application of the concepts and techniques of physics to systems at a higher level of complexity than ordinary molecular structures (e.g. the supramolecular and macromolecular structures) and is the focus of a major federal research funding initiative. A comparably exciting lecture program is being planned for next year.

Edward Pollack, Chair, Local Organizing Committee

Physics Department Hosts DAMOP 2000

The annual meeting, DAMOP 2000, of the Division of Atomic, Molecular, and Optical Physics of the American Physical Society was held in Storrs from June 14th to the 17th. An earlier meeting of the Division (DEAP at the time) was held in Storrs from May 30th to June 1st in 1984. DAMOP 2000 attracted an attendance of 700 which included a significant number of foreign participants who contributed to the more than 600 papers presented. In addition to those who attended the DAMOP 2000 scientific sessions, there were about 50 accompanying persons who had a range of activities available. A reception on Tuesday night (June 13th) in the new Rome Ballroom on South Campus opened the meeting. Acting Chancellor and Provost **Fred Maryanski** gave a welcoming address at the Plenary and Awards Session at Jorgensen Auditorium on Wednesday morning. During this session the Davisson-Germer Prize was given to **William Happer** (Princeton University) who presented a talk on "Spin Relaxation in Optical Pumping." **John F. Waymouth** was awarded the Will Allis Prize and presented a talk "Allis in Wonderland - Physics for Profit as well as Fun." The meeting included 14 specialized and focus sessions on a wide range of topics. To accommodate the large number of oral presentations it was necessary generally to run five simultaneous sessions. There were also four poster sessions with no competing presentations. On Wednesday night, **Dr. William Phillips** (a Nobel Prize winner in 1997), from the National Institute of Standards and Technology, presented a public lecture entitled "Time, Einstein and the Coolest Stuff in the Universe" which began with a reception and was followed by a well-filled house

at Jorgensen. On Thursday night our own Professor **George Gibson** presented a second public lecture on “Just What is the Connection Between Physics and Music?” The traditional DAMOP banquet was held on

Friday night in the Rome Ballroom. The festivities included the presentation of certificates to newly elected APS Fellows and the presentation of the annual AMO thesis award. The evening concluded with an exciting lecture on “Early Results from the Chandra X-ray Observatory” by **Harvey Tananbaum**, the Director of the Chandra X-ray Center and an Astrophysicist at the Harvard Smithsonian Center for Astrophysics. The official meeting ended on Saturday just after noon.

UConn Ultracold Research Funded

A large NSF group grant has been received by the UConn Physics Department to carry out research in ultracold science and spectroscopy. Approximately $1.2 million over three years will support a number of collaborative projects involving Profs. **Bill Stwalley**, **Ed Eyler**, and **Phil Gould**. The funded work will include experiments on ultracold molecules, photoassociative spectroscopy of ultracold atoms, ultracold Rydberg atoms and plasmas, and high-resolution spectroscopy.

Laser cooling enables the preparation of ultracold ($T < 1$ mK) samples of atoms. These techniques have revolutionized atomic, molecular, and optical physics, with examples ranging from Bose-Einstein condensation to improved atomic clocks. The impact of the work has been recognized by the awarding of the 1997 Nobel Prize in Physics to some of its early pioneers: Steve Chu, Claude Cohen-Tannoudji, and Bill Phillips. Meanwhile applications to new problems in physics and chemistry continue to grow, as evidenced by the recent grant to UConn. In the photoassociative spectroscopy research, two cold atoms are brought together in the presence of laser light to form an excited molecule. These molecules are often in unique states with very small binding energies and very large bond lengths. Properties of these states can yield very useful and precise information about interactions between the atoms. Variations of photoassociation allow the production of translationally ultracold ground-state molecules. Molecules are not easily laser-cooled, so molecular physics did not benefit from all of the ultracold developments - until now. Recent work, at UConn and elsewhere, has shown that excited molecules produced by the photoassociation of ultracold atoms can be coaxed to decay into stable ultracold ground-state molecules. This will allow new experiments in ultracold chemistry: collisions and reactions at sub-mK temperatures. Ultracold atoms are also being used as the starting point to produce ultracold Rydberg gases and ultracold plasmas by laser excitation or ionization. Rydberg states, in which the highly-excited electron moves very far from the nucleus, are extremely sensitive to

1999-2000 Colloquia Focus on Fundamental Questions in Physics

The 1999-2000 Departmental Colloquium series brought a number of distinguished physicists to UConn. The speakers covered a wide range of topics. Nevertheless, a recurrent emphasis throughout the year was on open questions of a fundamental nature in physics. The series began with a talk by UConn’s **Richard Jones**, a nuclear experimentalist with an active research program at the Jefferson Laboratory in Virginia. His colloquium treated experiments in electron scattering which attempt to “close the gap” between the quark model picture of hadrons and the fundamental theory of strong interactions, quantum chromodynamics.

Other topics covered during the fall semester included experimental tests of local Lorentz invariance, molecules in the early universe, and an experiment to search for physics beyond the Standard Model of electroweak interactions by performing a precise determination of the muon’s anomalous magnetic moment.

Several of the spring semester colloquia followed this theme of fundamental questions in physics. For example, Yale Professor **David DeMille** discussed plans to perform a new measurement of the electric dipole moment of the electron, while Prof. **Dan Kleppner** of MIT presented a history of the search for Bose-Einstein condensates.

Several colloquia focused on topics of more “practical” interest. There were talks by UConn Chemistry Prof. **Robert Birge** on the development of bioelectronics and their applications, by Prof. **Luke Mawst** of Wisconsin on the development of high powered lasers, and by Prof. **Kenneth Heller** of Minnesota on a problem-solving approach to physics education.

One talk which drew quite a number of attendees from outside the physics community was Brown Prof. **Brad Marston’s** colloquium on the quantum mechanics of global warming. Prof. Marston presented compelling evidence for global warming and related it to a few basic ideas in quantum mechanics. A lively discussion followed his presentation.

The process of seeking out and hosting colloquium speakers involved both faculty and students. Filling the year’s calendar with an array of diverse topics of general interest and high-quality speakers is a non-trivial and much appreciated task. We thank all who helped make last year’s colloquium series a success.

perturbations. At low temperatures, perturbations from neighboring atoms, as well as spontaneous ionization and collective behavior, can be carefully studied. Ultracold plasmas, where the electrons are very gently removed from ultracold atoms, should exhibit strong coupling, a high ratio of potential to thermal energy. The physics of plasma recombination, where the ions and electrons reunite back into neutral atoms, should also exhibit unusual behavior at these very low temperatures. The experiments in high-resolution spectroscopy are focused on precision measurements in simple systems, coherent optical processes, and highly-excited Rydberg states of molecules.

This new grant consolidates a number of existing projects and complements other ultracold work currently being carried out in the Physics Department. Collisions between ultracold atoms are being studied in Phil Gould's lab, while similar work with trapped ions is just getting under way in **Win Smith's** lab. Applications of ultracold Rydberg atoms to quantum computing are under investigation by **Robin Côté**, Ed Eyler, and Phil Gould. On the theoretical side, **Juha Javanainen** is continuing research on Bose-Einstein condensation, while Robin Côté is looking at ultracold collisions and ultracold molecules. **Yukap Hahn** is carrying out calculations relevant to ultracold Rydberg atoms and plasmas. The new NSF grant to UConn ensures that the Physics Department will continue to flourish as one of the world's leading centers for ultracold physics.

Sigma Pi Sigma Celebrates 50 Years of Excellence

The fiftieth anniversary of the installment of our Sigma Pi Sigma chapter was celebrated on April 28, 2000. Special guests included four charter members who were in attendance on May 25, 1950. These were past physics students **Joslyn Field**, **Samuel Humphrey** and **Richard Valentine** and Professor **William Orr** of the Chemistry Department. Following a lecture on "The Search for Bose-Einstein Condensation in Hydrogen" by Professor **Daniel Kleppner**, the Lester Wolfe Professor of Physics and Associate Director of the Research Laboratory of Electronics at MIT, we adjourned to the meeting room of the new UConn Foundation Building for further festivities. New members initiated into our chapter were undergraduate students Keith Corbino, Ben Taylor and Bradley Warner, and Professors **Barry Wells** and **Marcel Utz**. This year's award for excellence in the teaching of high school physics was presented to Mr. **Daniel Hoyt**, of the William Hall High School in West Hartford, CT.

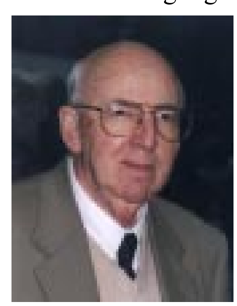
Following the banquet, our guests were honored. Joslyn Field, who continues to live in Storrs, went straight to Pratt and Whitney Aircraft Corporation in East Hartford upon graduation, where he worked for thirty years before retiring.

Sam Humphries entertained us with his stories of war-time Storrs. In the early 40s, the War Department sent recruiters to campus and snagged Sam, who together with 51 other UConn students was sworn in on the steps of Wood Hall. Sam returned to Storrs after the war to finish his degree and later earned an M.S. degree from Wesleyan University. He and wife Mary remain active on their Christmas Tree farm in Canton, Connecticut.

Richard Valentine and his wife, Elsie, were recognized for having traveled the furthest for our celebration. They have moved to the Phoenix area after Richard Valentine retired from the Bettis Atomic Power Laboratory, after 33 years there. He also related stories from fifty year ago, noting that he and Elsie, had rented a single room in a Willimantic home while they were students here.

Professor Bill Orr described the steps in his journey to Storrs in 1949. He had been an undergraduate at Princeton and gone from there to the Univ. of California at Berkeley to work with the well known physicist Glenn Seabourg. Seabourg later headed the U.S. Atomic Energy Commission.

The department is grateful for their participation in our celebration of the founding of our Sigma Pi Sigma chapter. While much has changed in fifty years, it appears that the quality of the students and faculty and their goals remain much the same. We have been aided in our efforts by Sigma Pi Sigma. Sigma Pi Sigma is an honor society whose purpose is to serve as a means of awarding distinction to students having high scholarship and promise of achievement in physics and to promote student interest in research and the advanced study of physics. The first chapter of Sigma Pi Sigma was founded in 1921 at Davidson College in North Carolina. The national organization grew rapidly following World War II. UConn (1950) and Trinity College (1949) were the first two chapters to be installed in Connecticut.



(pictured top to bottom: J Field, S Humphrey, R Valentine, D Hoyt with Dept Head, W Stwalley)

New Faces

Gloria Ramos joined the physics department in January, 2000, to take charge of instructional laboratory equipment and services. She received her B.S. in Physics (1992) and her M.S. in Physics (1995) from Florida International University. Her master's thesis was on using diode lasers in atomic physics and, specifically, for dissociative recombination experiments. She came to UConn in '95, first in Physics and then in the School of Education. She is currently working towards a Ph.D. in science education under the guidance of Dr. David Moss. She considers her role as "manager of laboratory services" to be a lot of fun. This past semester she also worked on a research project on teaching energy to fifth graders and co-instructed a course on methods in elementary science education. She expects her dissertation to involve physics at the college level.

When asked for personal information, Gloria said she is from Miami, Florida, and she likes reading, writing, music, movies, and theater. Digging more deeply, she confessed to being a technology junkie, a dog person and a Sagittarius.

Lorraine Smurra arrived in November, 1999 from Eastern Connecticut State University. She now handles our graduate admissions and undergraduate program, as well as coordinating our Research Experience for Undergraduates Program. Lorraine is a model of courteous efficiency and we are truly grateful that we have managed to add her numerous talents to our office team. She has also just become a new grandmother of twins and will happily tell you about them if you happen to notice their pictures as her computer's screensaver.

Marcel Utz joined our faculty in 1999 and is also a member of the Institute of Material Science. His immediately preceding position was as research associate at ETH Zurich, Switzerland, the institution where he obtained his Doctorate in 1998 and his Diploma in Materials Science in 1994. His doctoral dissertation and diploma thesis used NMR and other solid state techniques to study glassy and nanocomponent materials.

His research interests are on the plastic deformation of polymer glasses and other amorphous materials. Compared to present knowledge of plasticity of crystalline materials, that of amorphous materials is rudimentary. Learning the basic processes at work in these materials would lead to structure-property relationships. A practical goal is to design polymer materials with tailored plastic deformation properties.

A core difficulty with amorphous solids is developing concepts to describe the highly complex kinematics of deformation on an atomistic length scale. Without them we cannot interpret data from NMR or other studies. Progress is assisted greatly by detailed computer simulations. Simulations and concepts based on non-equilibrium statistical mechanics will also aid in establishing the role of relaxation dynamics in plastic deformation.

His future research will follow three mutually reinforcing lines. 1) NMR spectroscopy, including new techniques. 2) Computer modeling of atomistic and idealized coarser grained systems. 3) Techniques, such as gel spinning, to vary the packing parameters in polymer solids. He will interact with others in IMS, for example with the Center for Materials Simulation and/or with the Polymers and Biosystems Group. He will also teach courses in his areas of solid state physics and on his specialized techniques of experimentation and modeling.

Curriculum Reforms

Previous curriculum reforms have been driven by a perceived need to include new physics, or to discard parts of the subject less utilized. The current reform was driven by the need to retain a greater fraction of entering physics majors past the sophomore year. This problem is nationwide, as the average number of physics graduates per department has fallen to four (six at UConn). Part of the problem is recruitment into the major, of course, but study shows that loss of majors before the junior year is a significant factor. It seemed prudent to address the problem of retention before that of recruitment.

At a few schools around the country the undergraduate physics program thrives, presumably due to reforms put in place in response to falling graduation rates. The American Physical Society, in conjunction with the NSF and the AIP, arranged conferences at which the successful schools (where success is defined by a high graduation rate) described their efforts to representatives from other parts of the community. In October 1998, **Gary Bent**, **Phil Best** and **Doug Hamilton** (BBH) attended such a conference, where they heard a number of presentations from schools such as Rutgers, The University of Washington, Colgate University and The University of Illinois. On their return to Storrs BBH discussed their experiences, and from the array of programs chose a strategy which they considered had the greatest chance of success, given our resources. After a series of meetings with all interested faculty, the following curriculum reforms were adopted.

The reforms address two issues; student perception that sees as difficult and boring the introductory course, and a growing concern with degree outcome, i.e., jobs. Colgate University (including UConn alumnus **Joe Amato**) chose to replace the first semester mechanics course with an introductory, algebra-based modern physics course. The existing mechanics course had a calculus co-requisite, so all at once students were assailed with new math, vectors, and those parts of physics most subject to misconceptions. This combination of difficulties led to the frustration of many students. Other rationales described by the Colgate representatives included: " ... if students leave the department after one semester of physics, how would we like them to view the subject (boring, difficult, divorced from reality, point particles moving on frictionless planes)?" The algebra-based modern physics course gave better alternatives all around, so they tried it. Colgate currently graduates about 35 physics majors per year. We adopted this change and began teaching the course in the fall of 1999.

The traditional physics degree program prepares students for graduate school in physics. That the program also prepares students for many other graduate schools and jobs is incidental and not that well known outside of the profession. This rigidity of program, with an implied (if not real) narrow job training, possibly discouraged potential students from physics. Rutgers University increased their offerings to at least three degree programs, each tailored to a type of career. Rutgers currently graduates about 45 physics majors per year. We have followed the spirit of the Rutgers program and now offer a B.S. degree, General Option, and a B.S. Degree, Applied Option. These changes became operative in May, 1999. The details of the changes are too long to repeat here, but can be viewed at: http://www.phys.uconn.edu/~undaff/Index.html. At this site we also describe the types of career that each degree (B.S. General, B.S. Applied, and B.A.) prepares one for.

We have planned these curriculum changes in order to retain a greater proportion of those students who enter the major. Concurrent with the changes is a new focus in student advising. Physics majors are advised to become familiar with the array of jobs available, and to choose their degree program accordingly. Student enrollment patterns will be observed over the next few years to see whether the changes have their intended effect. Now we can look more closely at recruitment into the program.

Update on the New Biological Sciences Building

Construction work on the Biological Sciences Building, which will house five laboratory/office complexes for Physics, came to a halt during the winter of 1999-2000, when the contractor was dismissed because of extremely slow progress. Since then, negotiations have been under way between the University of Connecticut, the insurance companies, and the former contractor, HRH Atlas. It is expected that a completion contractor will be named in the near future. The new target date for completion is September of 2001. Until then, we are getting by in the Gant building by sharing teaching and laboratory space and in some cases by housing unrelated research groups in the same space. Everyone has been very generous in cooperating and in making minor sacrifices, which has allowed our teaching and research to continue despite the handicaps imposed by the complete exhaustion of our available space.

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In Memorium:

We were saddened to learn of the death of **Charles Edward Swenberg** on October 19, 1999. He had battled the debilitating effects of Crohn's disease for 30 years, but throughout this period remained a creative and productive physicist. A fellow of the American Physical Society, he contributed to several fields, including chemical physics, solid state physics, radiation biology, radiation chemistry and biophysics. Born in Meriden, Connecticut, in 1940, he earned his BS (1962) and MS (1963) degrees from the University of Connecticut, before earning his Ph.D. at the University of Rochester in 1967. At Storrs for his MS, as well as early in his Rochester period, he performed theoretical calculations with Professor Ralph Bartram. What comes to mind from his student days at UConn is the statement, "He is a very bright guy." I remember a number of students being in awe of his abilities. Professor Martin Pope of New York University, together with others who worked with Charles at NYU, Rochester and Maryland, contributed to an obituary which appeared in the April, 2000 *Physics Today* (Vol. 53). With Professor Pope's permission, much of this note is paraphrased or quoted from what they wrote.

After earning his Ph.D., Charles did postdoctoral work at he the University of Illinois and spent a number of years at New York University. He later joined the Armed Forces Radiobiology Research Institute in Bethesda, Maryland, where he headed the division of physical radiobiology and was the project manager of the radiation biochemistry department. As noted, his interests and accomplishments were wide-ranging. For his MS with Professor Bartram he investigated radiation effects in ionic crystals. In his Ph.D., he turned to Van der Waals solids, contributing to the then-young theory of exciton annihilation. This led to notable scientific contributions in the field of excitonic processes in organic crystals. In 1968, he and Stacy originated the concept of exciton fission of one electronically excited singlet state into two triplet states of lower energy, a then-novel mechanism of radiationless energy dissipation. In 1976, together with Geacintov and Pope, he called attention to the phenomenon of exciton-exciton collisions in photosynthetic membranes and provided the first quantitative explanation of nonlinear quenching of fluorescence in photosynthetic systems within the context of a continuum model of exciton diffusion.

Professor Pope and his co-authors wrote that, " In the last five years of his life, he was hospitalized almost half of the time. Although he was prevented from reaching his full potential because of his disease, through remarkable will power he maintained a positive attitude and succeeded in carrying out the work described above. Much of his equal contribution to the massive second edition of the classic book he wrote with Pope, *Electronic Processes in Organic Crystals and Polymers* (Clarendon Press, 1999), was made from his hospital bed. He earned the admiration of his physicians, who cared for him in a manner that made clear their devotion to a man of unique and towering courage."

Charles Swenberg's family is in the process of establishing a University of Connecticut endowment in his name, and Professor Martin Pope and others have already contributed significantly to this effort. The purpose of the endowment is to provide scholarship assistance to undergraduate and graduate physics students. A form has been provided later in this newsletter for those who would like to contribute either to this endowment or the Katzenstein endowment. In addition to this year's lecture and prize, the income paid for the banquet expenses for those students being inducted into Sigma Pi Sigma. If you would like to contribute to these funds, please indicate your desire to do so on the following form and send it directly to the University of Connecticut Foundation.

Quentin Kessel

❖ ❖

I/we are interested in supporting the Physics Department programs. Please direct my gift of $__________________ to:

❒ Katzenstein Distinguished Lecture series endowment
❒ Charles Swenberg endowment

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Thank you for your support!

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Any news about yourself that you are interested in sharing? We have enjoyed the unsolicited mail we received as a result of our last newsletter.

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From:

Professor Quentin Kessel
University of Connecticut
Department of Physics
2152 Hillside Road
Storrs, CT 06269-3046

Please, if this newsletter had difficulty in finding you, take a moment to provide the department with the following information. If our newsletter effort is to be successful, it is imperative that we develop an accurate mailing list.

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Please return this form to:

Professor Quentin Kessel, Ph. D. UConn '66
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Any news or suggestions for our next newsletter?

To: David Markowitz, Editor
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