

The University of Connecticut

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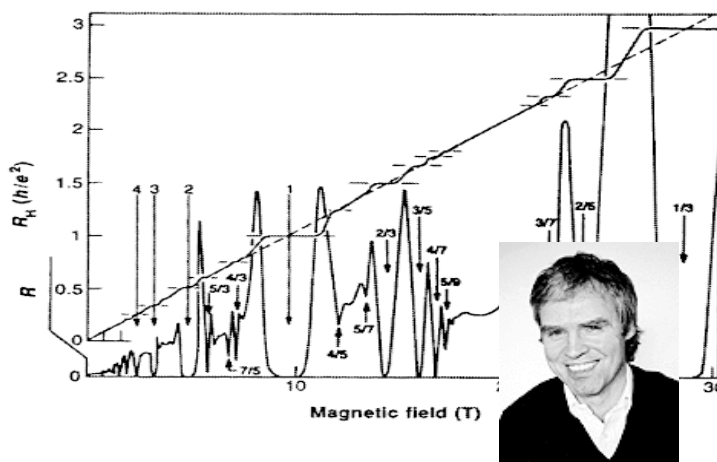
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DEPARTMENT OF PHYSICS NEWS

Volume I

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August, 1999



The new quantum fluid strongly resists compression; it is said to be incompressible. This is because it reacts to compression by forming more quasiparticles, which costs energy.

Dr. Störmer grew up in Frankfurt, Germany and received a Ph.D. in physics from Stuttgart University in 1977. In 1977 he joined Bell Laboratories, where he was Director of Physical Research Laboratory from 1992-97. Dr. Störmer received, among other awards, the 1984 Oliver E. Buckley Prize from the American Physical Society, and the Medal of the Franklin Institute, 1998, for his work associated with the fractional quantum Hall effect.

You are all invited to attend this year's Katzenstein Lecture and to learn about this fascinating area of physics from one of its pioneers. Festivities will begin with a reception in Physics at 3:30 pm, followed by the lecture at 4:00 pm and the banquet at 5:30 pm. Please see the last pages of this newsletter for details.

William D. Phillips, 1997 Nobel Laureate, Delivers Second Annual Katzenstein Lecture

The Physics Department was privileged to host a visit from **William D. Phillips** of the National Institute of Standards and Technology last fall. Dr. Phillips, a co-winner of the 1997 Nobel Prize in Physics, delivered the Second Annual Katzenstein Distinguished Lecture on October 23, 1998. His talk, "Almost Absolute Zero: The Story of Laser Cooling and Trapping," described his prize-winning work on the development of methods to cool and trap atoms with laser light. A capacity crowd, including Drs. Henry and Connie Katzenstein, endowers of the lecture series, enjoyed a very entertaining lecture featuring video footage of trapped atoms, a live demonstration of magnetic trapping, and some of the latest results in "ultracold physics," including Bose-Einstein condensation. Since ultracold physics is a major area of research in the Department, a pre-lecture discussion of perspectives and frontiers of the field was arranged. In addition, students, both graduate and undergraduate, had the opportunity to talk physics with Dr. Phillips. They found the experience most rewarding. Earlier in the day, Dr. Phillips gave a light-hearted slide and video presentation on the Nobel Prize ceremony, which included rare and exclusive shots of Nobel Prize winners imitating frogs (a Nobel tradition). The day was capped by a wonderful dinner at the Museum of Natural History. We all had a grand time. The Department offers its sincere thanks to both Dr. Phillips for visiting and the Katzensteins for sponsoring the lecture series.

KATZENSTEIN ENDOWMENT OVER \$100,000 GOAL

Faculty, Staff, 1938 Graduate Isaac Blonder, and UConn 2000 All Contribute

In the fall of 1996, **Dr. Henry S. Katzenstein** established the Katzenstein Endowment in Physics. The first priorities for the income from this fund are a distinguished lectureship and the Katzenstein Prize in Physics. This prize, first given in 1991, is to encourage undergraduate research and is awarded annually for the best research paper written by a UConn undergraduate on that year's research in physics. The

1999 winner of the prize is Sarah Donnelly, who you'll recall was awarded a Goldwater scholarship last year. Her essay, entitled "The Decay of the Lambda Hypernucleus," was based on research performed under the supervision of Dr. Michael Ramsey-Musolf. Drs. Henry and Constance Katzenstein first came to Storrs in 1951, where Henry was awarded the first Ph.D. granted by the Physics Department in

1954. They have sponsored and attended lectures by three Nobel Laureates at Storrs, including **David Lee**, a 1955 graduate of our department.

Gifts to the Katzenstein Endowment are eligible for matching by a forward-looking State of Connecticut program known as "UConn 2000." Contributions to this endowment have brought the total in the fund above the \$100,000 mark. Recently, Isaac Blonder, a

graduate of the class of 1938, donated \$10,000 to the department. The UConn 2000 program matched his donation on a 1 for 2 basis with another \$5,000. The income from this portion of the endowment will be used, at Isaac Blonder's suggestion, to support the exploration of new ideas and patents.

At present, UConn 2000 continues to add to all contributions to the fund on a 1 to 2 basis. If you give to the University of Connecticut Foundation, it will be to our considerable advantage if you make your contribution to UConn Foundation, Katzenstein Endowment for Physics #0130438. Regardless of the size of your donation, fifty percent will be added to it when it is placed in this fund. The income from this fund is already acting to strengthen our program, as you can read on other pages of this newsletter. We express our sincere appreciation to our generous donors.

Physics Department to Host National Meeting

The 31st annual meeting of the Division of Atomic, Molecular, and Optical Physics (DAMOP 2000) of the American Physical Society will be hosted by the Physics Department next year. As some readers may recall, the meeting (then called DEAP) was also held in Storrs in 1984. The scientific sessions will start on Wednesday, June 14th and run through Saturday, June 17, 2000.

An exciting program is being planned and will include sessions on cold molecules, implementation of quantum information processing, physics results from ion storage rings, the legacy of Gerhard Herzberg, applications of imaging detectors in AMO Physics, new medical applications of AMO Physics, new results in BEC, recent progress in quantum optics, atoms and molecules in intense laser fields, collective effects in Rydberg atoms, intermolecular potentials, alignment of molecules in intense fields, and late-breaking news in AMO science.

American Physical Society Celebrates Its 100th Birthday

No matter whether your connections to physics are strong and current or distant memories of the past, you would have delighted in the Centennial Meeting of the American Physical Society. It was



Dr. and Mrs. David Lee at the APS meeting in Atlanta, Georgia.

held in Atlanta, Georgia, March 20 - 26, 1999, and included numerous public interest talks, exhibits on the history of physics and physics in our lives, and a "Grand Reunion." At the Grand Reunion, our department hosted alumni and friends in a special reception area. More than fifty alumni, faculty and friends attended. These included Nobel Laureate and Cornell **Professor David Lee** (M.S., 1955) and **Dr. and Mrs. Sherman Fivozinsky**. Sherman, who received his Ph.D. from UConn in 1971, is with the Nuclear Physics Division of the U.S. Department of Energy. He is the Program Manager for Medium Energy Nuclear Physics and his program includes the Jefferson Laboratory in Newport News, Virginia where our **Professors Richard T. Jones** and **Michael J. Ramsey-Musolf** do most of their research. Professor Jones is an experimentalist using the laboratory's Continuous Electron Beam Accel-

erator Facility (CEBAF) to investigate rare radiative decays of phi mesons, and Professor Ramsey-Musolf is an established authority in electroweak theory and parity violations in hadron physics. UConn Physics connections to the Centennial include Professor Win Smith's co-organization of the Division of Laser Science exhibit and Professor Joe Budnick's inclusion on the 100-year timeline for the discovery of the spinglass cusp in magnetic susceptibility. Professors Eyler, Gibson and Stwalley were invited speakers and other members of the department presented 24 contributed talks and gave poster presentations.



Zinsheng (Sean) Ling, Ph.D. 1992, an Assistant Professor at Brown University, discusses the timeline with Professor Joseph Budnick. Professor Ling has won a Research Corporation award, a Sloan Foundation award and an NSF grant to support his research at Brown.



In the background, Professors Gilliam and Kappers greet Professor James Dolan, Ph.D. 1998, who is currently Department Head at Southern Connecticut State University. In the center, Professor and Mrs. Edward Pollack and Professor Quentin Kessel, Ph.D. 1966, share in a discussion with Dr. Sherman Fivozinsky, Ph.D. 1971, and his wife.

Charles A. Reynolds Lecture

The 1998-99 annual Charles A. Reynolds lecture, entitled "Neutrino Oscillations and Neutrino Mass," was delivered by **Dr. S. Peter Rosen** on April 16, 1999. The topic

was very timely, because of the intense interest that recent data have generated in the question of whether "new physics," beyond the "standard model" consisting of the electroweak Glashow-

Salam-Weinberg theory and Quantum Chromodynamics (QCD), is being observed. The most recent reports, from the “Super Kamiokande” experimental group, strongly suggest that neutrinos of one kind (family) oscillate into those of another kind, because family identity is not an exact eigenstate of the Hamiltonian that describes neutrinos in free space.

Dr. Rosen is an internationally recognized authority on neutrinos. He has published research and written extensively on the subject. He was Professor of Physics at Purdue, then held a leadership position in the Theory Division of the Los Alamos National Laboratory. He subsequently became Dean of Science at the University of Texas at Arlington — the site at which the now-defunct Superconducting Super Collider was then being constructed — until he recently accepted the position of Associate Director responsible for High Energy and Nuclear

Physics at the U.S. Department of Energy.

Dr. Rosen met with graduate and undergraduate students before his lecture, answered their questions and listened to their accounts of their research. Students and faculty responded enthusiastically to Dr. Rosen’s visit and colloquium.

Another date to set aside: The next Reynolds lecture will be given by **Professor Ching Wu (Paul) Chu**, University of Houston, on **March 10, 2000**. In 1987, Chu discovered a material that superconducts at -290°F. At this temperature, the superconductor can be cooled inexpensively with liquid nitrogen. His breakthrough discovery made this technology practical and brought it into the mainstream of science. Professor Chu was recently inducted into the Chinese Academy of Science (CAS) during the organization’s recent conference in Beijing, one of ten foreign scientists selected for this honor.



Awards to Faculty Members

Several faculty were recognized with significant awards this past year. **Gerald Dunne** received the Chancellor’s Research Excellence Award in May 1998 for theoretical studies which culminated in his book on Chern-Simons theories. **William Stwalley** received the Chancellor’s Research Excellence Award in May 1999 for experimental studies of molecules using laser light. **Joseph Budnick** received the 1999 AAUP Research Excellence Award; Joe’s experimental program has covered a wide range of materials and properties in the areas of magnetism and superconductivity. **Niloy Dutta**, Professor of Physics and Associate Director of the Photonics Center, was elected a member of the Connecticut Academy of Science and Engineering. **Juha Javanainen**, theorist in atomic and optical studies, was elected a Fellow of the American Physical Society. He is the eleventh APS Fellow in our department. **William Stwalley** was invited to give the first annual Journal of Molecular Spectroscopy Lecture and Review at the fifty-third Symposium on Molecular Spectroscopy in June 1998 and received the William F. Meggers Award for Spectroscopy at the Optical Society of America Annual Meeting in October 1998.



Departures and Arrivals

Three departmental members retired this spring and summer and were feted at a dinner party at Zenny's Restaurant in Storrs. Our laboratory coordinator, **Robert Erickson**, kept instructional labs in exemplary working order, helped with laboratory improvements, directed a small crew of equipment maintainers and repairers and assisted students with special needs. Bob, a UConn graduate in physics (class of 1974), helped the State in many ways. He was presented with an award at the party by the Board of the Connecticut Science Fair for the work he has done over many years to help make the yearly fair a success. **Howard Hayden**, physics professor, pursued research in atomic physics and in tests of relativity, originated and conducted the Journal Club for students to report on and hear about ongoing research, particularly on unusual topics, and published an Energy Newsletter (<http://www.EnergyAdvocate.com>) which examined production and use and evaluated the claims of other authors. Howard was known as a tough teacher; students who survived his courses emerged as much better people. **Linda Kruse**, Administrative Assistant to a medley of department heads,

was one of a key group of people who held the department together and ensured that it functioned



Dr. and Mrs. Howard Hayden, currently enjoying their "wide, open spaces."

well in all circumstances. She was usually our first link to anyone from outside the department contacting the department office or the department

Linda Kruse, currently enjoying "watching grass grow and traveling" with her family. William Stwalley, Head of the Department of Physics, and his wife Mauricette are in the front of the audience.

head. All three retirees gave many years of effort to all of us. **Denise White**, our previous Business Services Supervisor, has joined the Division of Athletics. **George Vartenigian** has also retired from his position as program assistant for the Kids are Scientists, Too program. **Cecile Stanzone** has joined us as our new Business Services Supervisor. She has had extensive office management experience in the corporate world. Assisting her is **Dawn Rawlinson** who joined us this past March.

Daniel J. McLaughlin, Ph.D. 1983, Professor at the University of Hartford, passed away in January. Dan also taught physics at the Avery Point and Waterbury campuses. He was an integral part of our community and is fondly remembered for his significant personal and professional contributions, as well as his love of books and his boat "Seabird."

Two outstanding new faculty are taking up residence in the Physics Department this fall. **Barry Wells**, an experimental condensed matter physicist with a Ph.D. from Stanford, did postdoctoral research at MIT before joining the technical staff at Boeing. His research interests include electronic and magnetic properties of oxides with novel character, including high-temperature superconductors, low-dimensional magnets, and materials with electronically inhomogeneous states. He is developing a thin film preparation laboratory using pulsed laser deposition. This technique will produce technologically and experimentally useful samples for photoemission, X-ray scattering, IR reflectance, and neutron scattering measurements.

Robin Côté, a theoretical atomic, molecular and optical physicist with a Ph.D. from MIT, came to UConn from the Harvard-Smithsonian Center for Astrophysics. His research interest is to use ultracold atoms to probe fundamental physics. He will continue and extend his previous work on neutral atom scattering and evanescent-wave atomic mirrors to atom-ion and atom-surface interactions in the ultracold regime. There are practically no experimental or theoretical studies of atom-ion scattering in that energy regime. The work on atomic mirrors will be similarly novel.

In addition, **Marcel Utz**, a polymer physicist, has accepted our offer (with the polymer science program) to join our faculty in August of 2000. His Ph.D. is from ETH in Zurich and he currently has a postdoctoral fellowship at Princeton. His research interests include the plastic deformation of polymer glasses, the development of related solid-state NMR methods, and the related stochastic modeling of glass-forming liquids. It is hoped that these three major approaches will clarify the mechanisms of plastic deformation in glassy polymers.



Paul Generous and Doug Hamilton present Bob Erickson with a gift for his retirement at the party at Zenny's restaurant.

Changes To Curricula

Following a national trend, our department has adopted new B.S. and B.A. requirements. The changes recognize that not all those motivated to study physics wish to pursue a higher degree in the subject, and that the skills mastered in obtaining a degree with a physics major are highly marketable. Candidates for all degrees will have more choice of courses than ever before. The

number of physics credits that a general-option B.S. degree candidate is free to select is up to fifteen, from six. An applied-option B.S. candidate has only fifteen specified credits among the forty-eight credits required from 200s level courses in physics, other sciences, math or engineering.

In a related action, the old course sequence for majors, consisting of Physics 141, 142 and

143, has been changed to 140, 141 and 142. The new 140 course is an algebra-based "Introduction to Modern Physics." It is a copy of a successful course introduced at Colgate University and is designed to be a 'first' course more stimulating than mechanics. In addition, it will not discourage the entry into physics of students who have not had calculus in high school.

Computers in Lower Level Labs

The introduction of computers into two of the lower level laboratory rooms, enabled by an NSF grant to Drs. Hamilton, Bent, Gibson and Best, has led to improved student performance and simplification of lab set-up procedures. Concurrent with that development, the rooms were renovated with dropped ceilings and new furniture. These alterations have brought about a marked improvement in the learning atmosphere in labs held in those rooms, so much so that the administration has provided \$50,000 for more computers and demonstration apparatus, with a matching sum from the Fund for Innovative Education in Science, created by the family of Harold S. Schwenk, Sr. in 1996. The administration has also agreed to renovate and refurnish the four rooms to receive these computers. When these changes are fully utilized, the experience of students in the labs will be more enjoyable and fruitful.

The Physics Department "Excellence in High School Physics Teaching Award"

The "Excellence in High School Physics Teaching Award" for 1999 was presented to **Gerald Hastava** of New Canaan High School. Evidence of Gerald's teaching quality is the selection of one of his students, Travis Hime, to represent the United States in the twenty-seventh Physics Olympiad, and the success of the "Junior Engineering and Technical Society Team" that he coaches. Gerald was cited for his devotion to all his students, not only the most talented. All referees emphasized his passion for learning, his enthusiasm for physics, and the high student motivation engendered by his teaching.

New Partnership in Nuclear Science with the RIKEN/BNL Research Center

Brookhaven National Lab has recently completed the Relativistic Heavy Ion Collider (RHIC) that will search for the quark gluon plasma - a theoretically predicted new state of matter. RHIC represents a \$500 million investment by the federal government and will be one of the two most advanced

nuclear facilities in this country. We also have a joint research program with the other top facility, the Continuous Electron Beam Accelerator Facility (CEBAF) at Jefferson Lab.

Recently, BNL and RIKEN, one of the foremost research institutes in Japan, have jointly established the RIKEN/BNL

Research Center (RBRC) to foster nuclear theory related to RHIC. RBRC includes a set of joint partnership faculty positions in nuclear theory with leading research universities including Columbia, Ohio State, Stony Brook, UCLA, UConn and Yale. Such positions were first proposed to

RIKEN in 1995 by Professor Moshe Gai, Director of our Laboratory for Nuclear Science, who subsequently took a leading role in pursuing their creation. These positions are analogous to our highly successful partnership positions

with Jefferson Lab in nuclear physics and BNL in condensed matter physics, described in last year's newsletter. It is expected that our new RBRC position will significantly enhance our intellectual community and reputation in nuclear physics

and better integrate us into the major scientific effort centered at BNL. Professor Gai is chairing our international search for this new faculty member in partnership with RBRC. This will be discussed in our next newsletter.

The University of Connecticut Chapter of Sigma Pi Sigma to Celebrate 50 Years of Excellence, April 21, 2000

Set aside the date! It will have been 50 years since the installation of our chapter of Sigma Pi Sigma. On April 21, we will meet in the Physics Library for refreshments, adjourn for a talk followed by the initiation of new members and a banquet. This special anniversary talk will be given by **Professor Daniel Kleppner**, the Lester Wolfe Professor of Physics and Associate Director of the Research Laboratory of Electronics at MIT. He is also well known for his "Reference Frame" contributions to *Physics Today*. We expect to have some charter members attend the celebration, fifty years after they were initiated into our chapter. To be on the mailing list for this event, please indicate your interest on the last page of this newsletter and return it to us.

Sigma Pi Sigma is an honor society whose purpose is to serve as a means of awarding distinction to students having high scholastic

achievement and promise 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 society grew rapidly following World War II. The University of Connecticut (1950) and Trinity College (1949) were the first two chapters to be installed in Connecticut.

Last year's lecture was given by Dr. Geoffrey West of Los Alamos National Laboratory on scaling laws in biological systems. Ranging well beyond the simple dimensional analysis met in undergraduate physics, Dr. West utilized scaling laws to correlate biological functions over "animals" ranging in size from amoebas to elephants. See the URL <http://www.lanl.gov/external/news/released_archive/97-029.html> for more details.

The Big Building

The new Biological Sciences building is now very visible to all of us, with its shell rising five stories above the Gant plaza. The building, shared by physics and several biological sciences departments, is one of the keystones of the UConn 2000 capital construction campaign. Its basement will house five large physics research laboratories and numerous offices for faculty and students. Full completion is

now expected in the spring of 2000. Several faculty members are already making moving plans, including George Gibson, Phillip Gould, and Niloy Dutta, as well as incoming faculty member Barry Wells. We look forward not only to the new research space, but also to the large public areas in the new building, which include a huge atrium with contemporary artwork, a large display area suitable for

poster sessions, and a café.

In a separate but related project, additional UConn 2000 funds will be used to completely replace the Gant Plaza deck and to erect a building atop it, for use primarily by IMS. Because of difficulties with structural engineering and cost estimates, the schedule for this project is still uncertain, but it appears that it will get under way sometime in early 2000.

An historical note:

In researching a comment from one of you, I was made to realize that the University of Connecticut's tradition of excellence in physics research began long before we had a recognized Physics Department. (The 1918 catalog listed "Mechanics - Physics 2a" under Mathematics, but the same course, now "Mechanics and Heat," was listed under Physics in the 1919 catalog. Other courses offered were "Electricity, Sound and Light" and "Household Physics.") The Storrs Agricultural Experiment Station was responsible for the University's first *Physical Review* article, published in

1899 (Vol. IX). This was published by the Experiment Station's first director, **Wilbur Olin Atwater**, who also served as a professor at Wesleyan University. The article's title was, "A New Respiration Calorimeter and Experiments on the Conservation of Energy in the Human Body." His article notes, "In 1894 provision was made by Act of Congress for an inquiry into the food and nutrition of the people of the United States....and the immediate charge was placed in the hands of the Director of the Storrs Experiment Station...." In 1895 the Legislature of Connecticut provided a special annual ap-

propriation to increase the scope of the investigation; Wesleyan University also participated in the study. The 1894 funding was about \$10,000, a considerable amount of money at that time. Research, then, was almost entirely subsidized by private foundations and individuals. Atwater's federal grant must have been one of the first direct federal appropriations for research. We've had entrepreneurs in Storrs from the beginning!

I apologize for not remembering which of you alerted me to this publication, but thank you!

Quentin Kessel

We invite you to join us for the Katzenstein Distinguished Lecture by Nobel Laureate Horst L. Störmer on September 17, 1999.

If you can attend, please return the last page of the newsletter and let us know your dinner preference. The campus has changed enough in the past year that you may find the following directions useful:

University of Connecticut: From I-84 east/west take exit 68. Travel south on Rte. 195 straight through the intersection of Routes 195 and 44. Proceed straight approximately 1.5 miles to the Storrs Campus.

Physics Building: From Route 195, turn right on N. Eagleville Road. At the second light, turn left onto Hillside Road. Parking is available in the parking garage immediately to your left (drive past the garage and turn left to enter). The Physics Building is located on N. Eagleville Road next to the garage.

Rome Hall Ballroom: The banquet is in the new South Campus Residence Complex. Park in the section of S-lot reserved for us. Campus maps will be available at the lecture.

CHECK OUT OUR WEB PAGE: <http://www.phys.uconn.edu>

One suggestion that we have had for our web page is to have an alumni section that would list the email addresses of those alumni who would like to be listed. If you have your own web page, we could even include a link to it from the UConn physics page. If you are interested in being listed this way, indicate this on the last page and return it to us. We're also searching for candidates for two positions in our department. See the above URL for details.



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.



From:

Professor Quentin Kessel
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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.

Name:

Preferred Address (if other than what we have used for this letter):

Phone number:

Yes, I will attend the September 17, 1999 Henry Katzenstein Distinguished Lecture.

- ☐ Please reserve _____ places at the banquet. Please indicate your menu choices:
_____ Lobster and Scallop Stuffed Chicken
_____ Carved, Roast Tenderloin
_____ Seared Tuna with Avocado and Salsa Verde
_____ Vegetarian Striped Ravioli with Sundried Tomato Pesto

Checks for \$35 per dinner should be made out to: *The University of Connecticut*

- ☐ Please send me a reminder for the March 10, 2000 Reynolds Lecture.
- ☐ Please send me a reminder for the April 21, 2000 Sigma Pi Sigma Lecture.
- ☐ Please include me on the alumni email list on the Physics web page.
My email address is _____.
I also have a web site address which is _____.

Please return this form to:

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Any news or suggestions for our next newsletter?

To: David Markowitz, Editor
at Department address



(Folding both ends of this sheet in will turn the response form into a mailer.)

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