

"All the v's

That's fit to Print"

ΦYAST ΦLYER

The Department of Physics & Astronomy

The University of Oklahoma

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REFLECTIONS ON 1998

The magnificent new classroom addition rising on the west side of Nielsen Hall is a fitting symbol of the Department's progress in the past year. Let me try to sketch out the highlights.

The new building is such an important step for us! The upper 2 floors will contain 2 large lecture halls, a lecture-demonstration preparation area, and a woodshop/loading area to replace lost space in the old building. The partial basement area will give us desperately needed storage space. We have had a very good relationship with the architect and with the University's Architectural and Engineering Services during the planning and have been able to have a great deal of "input." This part, Phase I, of the total project to add to and renovate Nielsen Hall is scheduled to be completed in November 1999, so we hope to have our first classes in the new addition in the Spring 2000 semester. The process has taken a long time and it

seems that every year during the past 4 years we have expected to be at this stage. In fact, this Phase I addition is much more expensive at \$4.8M than originally planned and were it not for the determination of President Boren to "do it right," we would still not be at this happy juncture. Now we would like to see phases II (office addition) and III (renovation of the current Nielsen Hall) commence. We hope that once again David Boren will find the necessary funds.

Meanwhile in old Nielsen Hall the faculty has been excelling as usual at research and teaching. We reaped a high number of teaching and research awards in the annual OU competition. Our fiscal year 1998 external funding was at a record \$2.3M and the current year promises to be even better. We just found out a few weeks ago that Neil Shafer-Ray will receive the Department's 5th NSF-CAREER grant! (Is this a national record?) Our research and teaching programs were reviewed internally and externally in the past year and found to be in great shape and worthy, we think, of additional University support.

We were especially proud of our physics and astronomy majors in the class of 1998. They had a phenomenal performance on the Major Field Achievement Test scoring at the 93rd percentile nationwide! It was exciting to be able to award the first Cuba and Ted Webb Scholarship to undergraduate Wade Wolf. Our advertisement for the Lin Graduate Research Fellowship has been run in *Physics Today* and we hope to make the first award for the coming academic year and then celebrate the occurrence and Professor Lin's 70th birthday in late spring 2000.

Our ranks were augmented this past year by a new faculty member, Eric Abraham, and a new post-doctoral associate, Andrew Elliott, both in the Atomic, Molecular, and Chemical Physics group. We were also delighted to have 7 new graduate students join us. So we're doing you proud, dear alumni!

SPRING AWARDS

Each spring the Department honors some of our outstanding students by giving them awards of recognition and sometimes even spendable stuff. Last April 30, the following undergraduates received awards: Lance Oelke (Homer L. Dodge Award for Outstanding Scholarship in Engineering Physics), Ryan Ciolli (Duane E. Roller Award for Outstanding Scholarship in Engineering Physics), Fred McKenna (The J. Clarence Karcher Award for Outstanding Scholarship in Engineering Physics), Eric Wolf (The Homer L. Dodge Award for Outstanding Scholarship in Physics & Astronomy), Abby Deans (The Duane E. Roller Award for Outstanding Scholarship in Physics & Astronomy), Christina Patrick (The J. Clarence Karcher Award for Outstanding Scholarship in Physics & Astronomy), and Ian Spielman (The Fowler Prize for the Outstanding Senior in the Department of Physics & Astronomy). Hearty congratulations to all of these students for their performances of high level and thanks for making us look so great!

RESEARCH FUNDING CONTINUES TO RISE

For the last fiscal year, the Department's research expenditures i.e. grant money actually spent, was \$2,227,443. This represents monies brought in by individuals and groups for research and teaching through grant awards. This is a continuation of a general upward trend which we've experienced over the last decade.

It is interesting to point out that this includes significant contributions from nearly all faculty, including some of our newest members. And this is all happening while we continue to be recognized for our good teaching each year!

RECENT DEGREES

Several graduate students have finished up their degrees and moved into careers during the last few months. Their names (degrees and advisors) are Terry Downard (MS; Mason), Chris Eck (PhD; Cowan), Kory Goldammer (PhD; Santos), and Tim Kwiatkowski (PhD; Mason). Best wishes to all of these students.

WELCOME

Andrew Elliott joined Mark Keil's group as a post-doctoral fellow to work on the state-to-state reactive scattering project. He is progressing very well, with his Australian charm in abundant evidence, at least when you can see him through the tangle of pipes and cables in the lab! Andrew joins our Department from the Atomic and Molecular Physics Laboratories at the Australian National University. Welcome, Andrew, we all hope you have an enjoyable and productive stay!

BABY COUNT

Postdoc Leonard Gamberg and his wife recently had a boy, Samuel Penn. Leonard works for Kim Milton.



BOB PETRY RETIRES

After 31.5 years as a member of the Department, Bob Petry is retiring next March 1. Bob joined the Department in 1967. Bob's primary research interest has been nuclear structure physics, working often at Los Alamos and Brookhaven National Labs. During his tenure in the Department Bob served both as Interim Chair (1970-1972) and Department Chair (1972-1974). Bob served as chair of many departmental committees such as Undergraduate Studies Committee and the Graduate Recruiting Committee. He also served several Committee. A terms. Bob has spent the last eight years as Associate Dean in the College of Arts and Sciences. His plans for retirement include travel, woodworking, volunteer work, whittling away at a 50-year reading backlog, learning to fly, and learning to speak Spanish and French passably. We are planning a combo departmental to celebrate his retirement probably in May.

NEW LOOK TO THE OFFICE



The front office has been undergoing a beautification of sorts. This place where visitors and new students often make initial contact with the Department has acquired a brand new set of black file cabinets, making the appearance uniform around the room. Gone are the days of mosaic, multicolored furniture and accessories in this room. A hodge-podge warehouse of rejects no longer, the office rocks, and will do so even more when the botanical phase of the improvement project gets underway. Yes, plants and trees (even!) of various kinds will be brought in to soften the appearance. All the more reason for the alumni to stop by. We'll lend you a watering can.

ALUMNI NEWS

From Eric Butcher (BS, EP, 1993): "I received my B.S. in engineering physics from OU in 1993. I worked on several projects with Greg Parker while there. I have recently become Assistant Professor of Mechanical Engineering at the University of Alaska Fairbanks and also Research Associate at the Arctic Region Supercomputing Center. I got my Ph.D. in mechanical engineering from Auburn Univ. in 1997 (specializing in nonlinear and chaotic dynamics, vibrations, and controls) and spent one year as a postdoc at Sandia National Laboratories in Albuquerque, NM. My wife Melanie and I have 2 boys: Sky (age 3) and Dakota (born May 1, 1998). Our hobbies in Alaska include sled dog racing (we have 6 huskies and are planning to breed many more!).

Eric A. Butcher (907) 474-5649 ffeab@aurora.alaska.edu

Eldon Ferguson received an honorary doctorate of science from the University of Innsbruck (Austria) on June 6, 1998. Eldon says that it was particularly satisfying for him because Paul Crutzen traveled from Maine to deliver the laudatio for his award. Paul was a member of Eldon's lab in Boulder about 25 years ago and shared the Nobel Prize in Chemistry in 1995.

COMPUTING NEWS

By now, even folks who have never touched a computer have probably heard about the "Year 2000 problem". (In case you have been unable to keep up with current events due to the fact that your Web browser has been unable to contact your news server for the past two years, the problem involves all of the computer code that stores the year as only two digits - which will fail to properly work when the assumed initial "19" becomes "20".) So, will the Department disappear into a black hole on January 1, 2000? Should you expect no more issues of the Phyast Phlyer?

Fear not! The University of Oklahoma has a man, a plan, - but no canal... The University's Department of Computing and Telecommunication Services (DTCS) has assigned a person to coordinate campus-wide efforts to meet this threat. Furthermore, each department has assigned a point-of-contact person (me, in our case) to coordinate their efforts and report to the University-wide contact. (For more information on the OU plan, see: <http://www.ou.edu/y2000/> which has information you may find useful for your own computer.)

Ultimately, the problem is only really serious if there are programs which, if they failed, would bring significant activities of the department to a halt. Thus, if our e-mail stopped functioning, for example, we would have a problem. We have checked our systems, fixed a few minor problems and appear to be ready for the millennium. This took only a small amount of effort mostly due to the fact that our office PCs do not run any accounting

programs and our Unix operating systems were already compliant due to security patches. Of course, there are likely to be many little things that still go wrong when the odometer turns over, but we are confident that those can be handled easily when they occur.

Now, we can start preparing for the more serious problem that occurs in 2038 when the Unix 'time' command rolls over!

Andy Feldt

ODDS AND ENDS

John Walkup has put up photos of the Department's fall picnic on his web page, <http://www.telepath.com/cuestix/picnic.htm>. Says John; "I thought it might be fun to have humorous captions made for each photo. So email me your suggestions (walkup@nhn.ou.edu). Maybe we can turn it into a contest."

Quote from a student, who was performing an experiment on the air track,

"If the cart isn't moving, how are we supposed to measure its speed?"



RESEARCH NEWS

Papers Published

K. A. Milton, I. L. Solovtsov and O. P. Solovtsova, "The Bjorken Sum Rule in the Analytic Approach to Perturbative QCD" Phys. Lett. B 439, 421--427 (1998).

D. Branch, "Type Ia Supernovae and the Hubble Constant", Annual Reviews of Astronomy and Astrophysics, 36, 17 (1998)

"Determination of the concentration and temperature dependence of the fundamental gap in $Al_xIn_{1-x}Sb$," N. Dai, F. Brown, R.E. Doezema, S.J. Chung, K.J. Goldammer, and M.B. Santos, Applied Physics Letters, vol. 73, pp3132-3134 (1998).

C. Stockdale, W. Romanishin and J. J. Cowan, "Discovery of a Nuclear X-ray Source in NGC 7331: Evidence for a Massive Black Hole," Astrophys. J. Letters, 508, L33 (1998).

C. R. Eck, D. A. Roberts, J. J. Cowan and D. Branch, "The Probable Detection of SN 1923A: The Oldest Radio Supernova?," Astrophys. J., 508, 664 (1998)

"Two distinct populations of Kuiper-belt objects" (S.C. Tegler and W. Romanishin) Nature v 392, p. 49 (1998)

"Discovery of a Nuclear X-Ray Source in NGC 7331: Evidence for a Massive Black Hole (C. J. Stockdale, W. Romanishin, J. J. Cowan) Astrophysical Journal, v. 508 p. 33.

Grants Awarded

Eric Abraham, Research Innovation Award from the Research Corporation, \$34,600.

NSF Career \$325,000 "Topological Excitations in Two Dimensional Systems," S. Murphy

REOS (Research and Educational Opportunities in Semiconductors) from the OK Regents for Higher Education \$240,000 (Doezema, Johnson, Mullen, Santos, Mason, Murphy, Furneaux and Keil).

Bill Romanishin: \$9,591 (1998) A Photometric Survey of Trans-Neptunian Objects (subcontract through NAU - NASA Origins of Solar Systems); \$66,024 (1999-2001) An Optical Survey of Trans-Neptunian Objects (subcontract through NAU - NASA Planetary Astronomy Program)

Meetings Attended

Seokjae Chung gave a talk at the 17th North American Molecular Beam Epitaxy Conference at Penn State on October 5. The presentation was "A study of factors limiting electron mobility in InSb quantum wells" by S.J. Chung, K.J. Goldammer, S.L. Lindstrom, M.B. Johnson and M.B. Santos.

Kim Milton: Fourth Workshop on Quantum Field Theory Under the Influence of External Conditions, Leipzig, Germany September 14-18. Invited lecture: "Julian Schwinger and the Casimir Effect: The Reality of Zero-Point Energy". Contributed paper: "Sonoluminescence and the Dynamical Casimir Effect."

Sheena Murphy: Poster at the "Disorder and Interactions in Quantum Hall Systems" meeting at the Institute for Theoretical Physics (Santa Barbara, CA) in August, Kieran Mullen also attended.

Georg Steinbrueck: "Beam Test Results for the D0 Upgrade Microstrip tracker" presented at the 1998 IEEE Nuclear Science Symposium and Medical Imaging Conference in Toronto, Canada, November, 10-14, 1998

Bill Romanishin: Flagstaff, AZ, Sep., 1998, "Exploring the Kuiper Belt: Where do we go from here?" and Madison, WI, Oct, 1998, Division of Planetary Sciences annual meeting. At both meetings, Bill and collaborator Steve Tegler of Northern Arizona University each presented papers- one was on colors of KBOs, the other on sizes and shapes of KBOs.

John Furneaux attended 2 meetings this past summer: 9th International Meeting on Lithium Batteries, 12-17 July 1998 in Edinburgh, Scotland, where he and his collaborators presented "Comparative Study of Polymer Gel Electrolytes", S. Abbrent, M. Svensson, J. Lindgren, J. Tergenfeld, J. Furneaux, and A. Wendsjoe. He also attended the 11th International Conference on Superlattices, Microstructures, and Microdevices held in Hurgada (Red Sea), Egypt, from 27 July to 1 August 1998. The paper presented was "Two-Dimensional Electron Systems in InSb Quantum Wells" K.J. Goldammer, N. Dai, J. Hicks, S.J. Chung, F. Brown, S. Raymond, W.K. Liu, R.E. Doezema, J.E. Furneaux, S.Q. Murphy, and M.B. Santos.

Dick Henry: "Chemical Evolution from Zero to High Redshift", ESO Workshop, Garching (Munich), October 14-16.

Tibor Herczeg attended the May 1998, meeting of the German Astronomical Society, held in Gotha, Germany. He presented an historical talk on "Early Studies on Nebulae".

Talks Given

Eric Abraham, "The Coldest Physics: Atoms at nano-Kelvin temperatures", presented at St. Olaf College, Northfield, MN, November 18.

Kim Milton: Colloquia: "The Search for Magnetic Monopoles," Iowa State, November 2, 1998; University of North Texas, November 17, 1998.

John Cowan gave a public talk as part of the Friday Night at the Observatory lecture series, October 23 - "How Old is the Universe?"

Jackie Milingo: "Planetary Nebulae: The Adventures of a Dying Sun", November 20, lecture for Friday Night at the Observatory.

Mark Keil gave an invited talk, "Chemical Dynamics for the $F+H_2 \rightarrow HF+H$ Reaction", with co-authors G.Dharmasena, T.R.Phillips, S.Crocchianti, and G.A.Parker, at the Symposium on Molecular Structure and Dynamics, Southwest Regional American Chemical Society Meeting Baton Rouge, Louisiana, November 1--3, 1998.

John Furneaux gave an invited talk as experimentalist of the week 5-9 October 1998 as part of Program on Disorder and Interactions in Quantum Hall and Mesoscopic Systems, August 1998 - December 1998, Coordinators: S. Das Sarma, M.P.A. Fisher, S. Girvin, and A. MacDonald, at the Institute for Theoretical Physics, at University of Santa Barbara "Conductivity Transitions in 2D: B=O, QHE/I, and Composite Fermions" see at <http://www.itp.ucsb.edu/online/qhall98/furneaux/>. John also presented a talk at the University of Stockholm, Department of Physics, "2D or not 2D, that is the Question," 20 May 1998.

Dick Henry, "Abundance Profiles in Disk Galaxies from Nebulae", October 12, Osservatorio Astronomico di Brera, Merate (Milan) Italy.

Tibor Herczeg gave two talks in May, 1998, at the Bamberg Observatory in Germany: " Early Studies on Nebulae", and "Masses of Neutron Stars".

Research Travel

Mike Santos, Jim Hicks and Sheena Murphy all visited the National High Magnetic Field Laboratory in Tallahassee FL. They used the 17-Tesla magnet to look for the fractional quantum Hall effect in Mike's samples and saw some interesting stuff, which warrants a return trip.

Bill Romanishin: "In 1998, I took 4 trips to Arizona to use various telescopes there in collaboration with Steve Tegler from NAU. Tegler and I also observed on the Keck II 10-meter optical telescope, one of the largest in the world, located on Mauna Kea on the Big Island of Hawaii. We toured the mountain in the afternoon, but we actually observed from a town near the beach, linked to the telescope with a high-speed data link. (With the combination of lack of sleep AND lack of oxygen - Mauna Kea altitude is 4200 meters - astronomers observing on MK have been found to behave even less intelligently than at sea level, so almost all Keck observing is done with the astronomers far from the telescopes.) Although some minor technical problems lost us some time, the observing was awesome- conditions were as good as advertised."

John Furneaux spent his sabbatical at Uppsala University in Sweden August 1997-August 1998.

John Furneaux visited Peter Bruce's group which studies Li Batteries at University of St. Andrews, St. Andrews, Scotland, 1-4 July, 1998 to

discuss the latest developments in Li Batteries, especially Impedance measurements; and to explore possibilities for future collaborations.

Visitors Hosted

Paul McEuen (Engr. Phys. B.S. '85) visited the department on November 4 and 5. He gave two talks on research he's done as a member of the Physics faculty at UC Berkeley: "Carbon Nanotubes - A New Class of One Dimensional Conductors" at the Departmental Colloquium and "Scanned Potential Microscopy of Quantum Hall Conductors" at the Solid State Seminar.

K.S. Babu, OSU, October 1, visited Kim Milton and discussed neutrinos.

Tim Beers, Michigan State U., visited John Cowan in November for a week. They are working on projects with the Keck telescope and the HST to understand the formation of the heavy elements in the Galaxy.

Research Breakthroughs

Kim Milton: "My most spectacular discovery this fall occurred because of my trip to Leipzig, for the Fourth Workshop on Quantum Field Theory Under the Influence of External Conditions, largely devoted to the Casimir effect. The great H.B.G. Casimir himself was there. Because of conversations that ensued there, I have been able to prove for a nontrivial geometry that the Casimir effect is indeed exactly equivalent to the sum of van der Waals forces between molecules for dilute materials. This is a significant advance in understanding, and should help in extracting finite observable effects from what is usually plagued with divergence difficulties. This result makes it even less likely that the dynamical Casimir effect has anything to do with sonoluminescence."

Bill Romanishin's work (with Steve Tegler) on the colors of Kuiper Belt Objects, published in NATURE, garnered lots of interest. The work was featured in several science web sites (including ABCnews.com) and in DISCOVER and Sky and Telescope magazines, among others.

Tibor Herczeg and student Matt Maloney have found five photographic plates in the OU Observatory archives, which contain images of Nova Cygni 1938. These images confirm earlier findings that a third eruption of this nova did indeed occur. Herczeg and Maloney's findings were reported at the annual AAVSO meeting in Boulder.

SCRATCHPAD

There were no respondents to the physics history questions in the last newsletter. You don't get the answers until I get some responses. Can you imagine going to your grave not knowing who those people are? Get with it!

Dick Henry



HAPPY NEW YEAR!!!!