

"All the v's

**That's fit to Print"**

# ΦYAST Φ LYER

*The Department of Physics & Astronomy*

*The University of Oklahoma*

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## **REFLECTIONS ON 1997**

Our department has prospered in the 90s and 1997 was certainly no exception. We passed milestones, accomplished goals, set new directions, and received record support from our alumni and friends.

Our external research funding hit the \$2M mark for the first time and we know that this faculty achievement will not be a high-water mark thanks to the promise of the recent funding successes of the faculty hired in the last few years. (Just in the past 2 weeks, we learned that 3 of them, Matt Johnson, Sheena Murphy, and Mike Santos, will all receive new 4-year CAREER awards from the NSF!)

The funding drive to endow the Lin Graduate Research Fellowship is a success. To date, thanks to our alumni and friends, the fund is currently at \$50,000. Thus, in this the final year of the drive, we will surely top our goal of at least \$60,000. Professor Chun Lin has agreed to our proposal of a 70th birthday symposium in spring 2000 to honor him and celebrate the first Lin Fellowship as well.

The year's big surprise was the generous gift of \$29,000 from Ted (BS 1951) and Cuba Webb to endow the "Cuba and Ted Webb Scholarship" for undergraduate majors in Physics and Astronomy. How wonderful! We plan to award the first scholarship for the fall 1998 semester.

It really was the year of the alumni! We not only received such generous gifts but also had the privilege of visits from some of you including G. Ward Paxton (Ph.D. 1964) in April, Ted Webb in September, and Robert L. Carter (BS 1941) in November.

The year 1997 was not without welcomes and good-byes. We regretfully said good-bye to Maureen O'Halloran, who joined the faculty at Rowan University in New Jersey, and also to Vicki Dixon, whose term as our librarian was all too short. We welcomed new post-docs Horst Severini (high energy) and Ning Dai (solid state). Our entering class of graduate students, a bumper crop of 16, really helps to boost our optimism.

So, thanks for your support! May we all enjoy a good 1998!

## **HELLO**

We have two new graduate students this semester: Mr. Tuck Meng Goon (from Malaysia) and Ms. Varuni Seneviratne (from Sri Lanka). Tuck received his BS from us in December. Varuni received her BS from U of Peradeniya in SL in April 96. She's been trying to get here since last summer and just now made it!

## **GOODBYE**

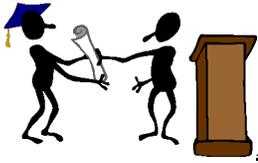
Kyungsun Moon, a postdoctoral research scientist working on condensed matter theory with Kieran Mullen, has accepted a professorship at Yonsei University in Seoul, Korea. Yonsei is a major research university, where Kyungsun had done his undergraduate studies.

"I'm sorry to lose such a wonderful talent in the department, but it's for the best possible reason", said Kieran. "Our collaborations will continue after Kyungsun gets set up there. He's been a great help in our group's research."

While at OU Moon and Mullen worked out a new effective model for the interaction between "skyrmions" - small electrically charged lumps present in thin layers of semiconductors in a high magnetic field. They also determined how a "meron" (a related object found in double-layer systems) will pass through a narrow channel. Prof. Sheena Murphy is planning to do the experimental measurements in the near future. Finally, they have been looking at the dynamics of a set of skyrmions, looking at how they interact, and whether they arrange themselves in crystalline patterns.

Kyungsun has been a great help to the whole group. He's given theoretical support to both Sheena Murphy and John Furneaux's experiments. He's also given a number of the Condensed Matter and Informal Theory Seminars.

We look forward to a long period of collaboration with Prof. Moon in the future, and we hope the whole department will join us in wishing him the best of luck in his new position.



## ALUMNI NEWS

Kent Smith (jksmith@sweetwater.tstc.edu) is employed at Texas State Technical College in Sweetwater, Texas. Kent reports, "I have now been here the entire seven plus years since completing my Masters at OU during the Summer of 1990. I teach a wide variety of courses in physics, physical science, and mathematics. I have tried to attach a "bitmap" image of an engagement photo just to refresh your memory as to who I am (and who I am now attached to!)." Kent also reports that he was married on Saturday, November 29. Congratulations!

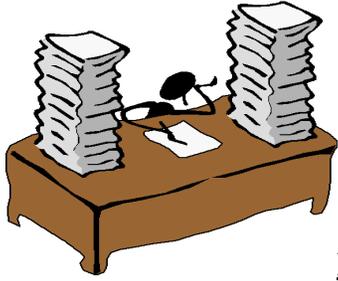
Dan Sinars (ds67@cornell.edu; BS PHYS 97) is currently a graduate student in physics at Cornell University.

Marvin Clarke (BA PHYS 1946) of Jupiter, FL, was involved for years after WWII and graduation with top secret government programs including collecting data relevant to atomic test detonations and the Spy Satellite Program. In 1957 he went to work as a Senior Systems Engineer for the GE Space Division, Valley Forge, PA, until his retirement in 1980. Lately, he has orchestrated an effort to collect testimonials from his coworkers in the top secret programs now that the programs have been de-classified. The group has attracted the interest of the Oral History Group at the National Air and Space Museum, for possible archiving and exhibition. To debrief Marvin on his secret past as well as his more recent work in the space program, contact him at [MarvinFC@aol.com](mailto:MarvinFC@aol.com).



## FALL SKYWATCHING

As part of the annual Friday Night At The Observatory fall lecture series, the Department hosted three speakers, one each in September, October, and November. In September, a Mars exploration update was presented by Dr. Susan Postawko of OU's School of Meteorology. October's lecture was given by Dr. Reggie Dufour of Rice University on the Hubble Deep Field. In November, we heard from Chris Stockdale, OU graduate student in Astronomy, on black holes. Each lecture was followed by an observatory openhouse. The observatory part of the evenings were particularly successful this year, with large numbers of students and Norman locals showing up to peer through our collection of telescopes. Information on next fall's programs will be available in August.



## PAPER CHASE

### Recent Publications

K. A. Milton, I. L. Solovtsov, and O. P. Solovtsova, "Analytic Perturbation Theory and Inclusive Tau Decay," Phys. Lett. B 415, 104-110 (1997).

"Search For Scalar Leptoquark Pairs Decaying to Electrons and Jets in proton-antiproton Collisions", (D0 Collaboration), B. Abbott et.al., including Strauss, Gutierrez, and Kalfleisch, Phys. Rev. Lett. 79, 4321 (1997)

K. Hatano, A. Fisher, D. Branch, "Extending the Dawson and Johnson Model for the Visibility of Galactic Supernovae", MNRAS, 290, 360 (1997)

K. Hatano, D. Branch, A. Fisher, and S. Starrfield, "On the Spatial Distribution and Occurrence Rate of Galactic Classical Novae", MNRAS, 290, 113 (1997)

K. Hatano, D. Branch, A. Fisher, and S. Starrfield, "New Insight into the Spatial Distribution of Novae in M31", ApJ, 487, L45 (1997)

D. Branch, "Density and Destiny", Nature, 391, 23 (1998)

K.B. Kwitter & R.B.C. Henry, "A New Look At Carbon Abundances In Planetary Nebulae III: DDDM1, IC 3568, IC 4593, NGC 6210, NGC 6720, NGC 6826, & NGC 7009", Astrophys. J., 493, 247 (1998).

G.H. Jacoby, J. Morse, L.K. Fullton, K.B. Kwitter, & R.B.C. Henry, "Planetary Nebulae In The Globular Clusters Pal 6 And NGC 6441", Astron. J., 114, 2611 (1998).



## GRANTS

John Cowan received a Big XII Faculty Fellowship, for \$2,000 to travel to and work at University of Texas at Austin, on several research projects involving the origin of the heavy elements and the age of the Galaxy.

David Branch, \$7500, Supernova INTensive Studies, Harvard.

"Center for Photonic and Electronic Materials and Devices," NSF-EPSCoR Cooperative Agreement (OU, OSU, TU) with Roger Frech et. al. 1/1/98 to 12/31/00, \$1,314,497 (this includes the whole solid state group!)

## **RESEARCH TRAVEL**

Mike Strauss has travelled to Fermilab a few times in the last several months, including attending a D0 Collaboration meeting for three days in January.

Kieran Mullen went to Europe to collaborate with two different physicists in the month of August (over the summer). He spent a week at the University of Utrecht, in the city of Utrecht, in the Netherlands, where he worked with Prof. Henk Stoof on some issues related to skyrmions. He then visited the Royal Institute for Technology in the Stockholm, Sweden and worked with Prof. Mats Wallin on understanding phase transitions on curved surfaces. The whole trip was very productive and lots of fun!

David Branch spent a week in December at the Supernova Workshop of the Institute for Theoretical Physics at Santa Barbara. He gave a talk on "Direct Analysis of Supernova Spectra" and outlined a book for Cambridge University Press on "The Theory of Supernovae" with Ken'ichi Nomoto (Tokyo) and Hans-Thomas Janka (Munich).

Kim Milton spent a week in St. Louis working with Carl Bender working on possible supersymmetry breaking. Too bad, it doesn't break. (Maybe that's why there is no experimental evidence for supersymmetry!)

## **VISITORS**

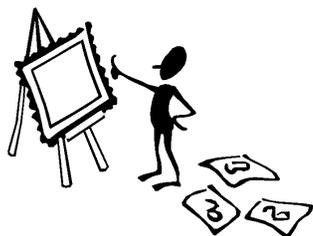
Kim Milton hosted two visitors in October: Greg Adkins from Franklin and Marshall College, and Jagdish Mehra from the University of Houston. Mehra and Kim are collaborating on a scientific biography of Julian Schwinger called Climbing the Mountain.

Friedel Thielemann (Basel) and Jim Truran (Chicago) visited John Cowan for a week during October 1997 to work on several research projects and on their graduate textbook (see below).

Reggie Dufour (Rice University) visited Dick Henry in October to work on their planetary nebula projects.

## **RESEARCH AS IT HAPPENS**

Kim Milton is working on furthering our understanding of strong interaction phenomena--Quantum Chromodynamics--with Igor and Olga Solovstov, who are visiting us this semester from the Bogoliubov Laboratory, Joint Institute for Nuclear Research, Dubna, Russia. They are developing variants of perturbation theory which are more stable and more reliable, and which incorporate, hopefully, essential nonperturbative information, called variational perturbation theory and analytic perturbation theory. Having applied such techniques to processes involving timelike momenta, such as tau decay, they are now examining spacelike processes, such as deep-inelastic sum rules. This work will ultimately prove essential for the connection of data extracted from different experiments and for the connection of experiment to theory.



### INVITED TALKS, COLLOQUIA, SEMINARS

John Cowan presented a talk entitled "Stellar Abundance Observations" at the Second Oak Ridge Symposium on Atomic and Nuclear Astrophysics, (December 1997) in Oak Ridge, TN. He also spoke on "Heavy Element Nucleosynthesis", at the University of Notre Dame in September, 1997.

Mike Santos presented a colloquium, entitled "Fabrication and Electronic Properties of InSb Quantum Wells," at the University of North Texas on November 25.

Dick Henry gave an invited review "Abundance Profiles of Disk Galaxies from Nebulae", at a workshop on "Abundance Profiles: Diagnostic Tools for Galactic Evolution", October, 1997, in Quebec City, Quebec.

### BOOKS

Classical Electrodynamics by Kim Milton is in the hands of the publisher, Addison-Wesley. Once the series editor, David Pines, gives his okay, which is expected, the book, at 569 pages, and 52 chapters, will go into production. Look for it soon at your favorite bookseller.

Friedel Thielemann at Basel, Switzerland, Jim Truran at Chicago, and John Cowan hope to finish their book, "Nuclear Evolution of the Universe" this year. During the last year, Friedel and Jim came to OU to work on the book and John took trips both to Chicago and to Basel to help finish it up. The University of Chicago Press is contracted to publish it when completed. During this spring semester John is using the unfinished manuscript as his text for his graduate course on Stellar Interiors. He is hoping to get some useful feedback from the students about it. The text is designed both for graduate students and for workers in the fields of stellar evolution, nucleosynthesis, nuclear physics and nuclear astrophysics.

### MEETINGS ATTENDED, PAPERS GIVEN

Several graduate students attended the 191st American Astronomical Society Meeting, January 6-January 10, 1998, in Washington D.C. The following posters were presented:

"Extinction and Radial Distribution of Supernovae in Their Parent Galaxies" by Hatano, K., Deaton, J., and Branch, D.

"Neutron Capture Abundances in Galactic Halo Stars" D. Burris (OU), C. Sneden (U.Texas), C. Pilachowski and T. Armandroff (NOAO) and J. Cowan (OU)

"Prospecting for Stellar Abundance Gradients in Spiral Galaxies Using IR Images", J.W. Howard, R.B.C. Henry, W.J. Romanishin.

"The Probable Detection of SN 1923A: The Oldest Radio Supernova or The Youngest Supernova Remnant", C. Eck (OU), J. Cowan (OU), D. Branch (OU) (and Douglas Roberts should be credited but wasn't in the poster title from UIUC, Illinois) "When not attending the meeting, we got to frolic about our nations capital, and see the sights....", stated one of the students.

Kory Goldammer and Xiao Ming Fang presented talks at the 16th North American Conference on Molecular Beam Epitaxy in Ann Arbor MI on October 5-8. Kory's talk was entitled "Electrical Properties of InSb Quantum Wells Remotely-Doped with Si," and Xiao Ming's talk was entitled "MBE Growth of PbEuSe/PbSe Heterostructures on CaF<sub>2</sub>/Si (111)."



### **GRAD STUDENTS UNCUT**

John Walkup writes, "I passed my Specialists Exam on Landau-Zener tunneling in December. Right now our group is busy preparing three papers for publication:

The one I am writing relates the locations of avoided crossings of diamagnetic hydrogen to singularities (square-root branch points) on the complex  $|m|$ -plane, where  $m$  is the magnetic quantum number. One of the other papers maps the trajectories of these branch points as functions of magnetic field strength. The third paper attempts to resolve the mysteries of the energy spectrum and wave functions of the one-dimensional hydrogen atom, a long-time controversial subject.

John Carzoli (also in our group) and I are preparing two separate posters to present at this spring's DAMOP conference in Santa Fe. Carzoli's poster will cover his research in helium.

Fred Brown, Physics grad student, frequently hosts parties at his domicile. Informed sources say that these events are the sites of the ritual post qualifier burning of the notes....especially if you have passed the exams.