

"All The v's That's Fit
To Print"

ΦYAST ΦLYER

*The Department of Physics and Astronomy
The University of Oklahoma*

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Reflections on 2006

The year 2006 was a year of steady progress for the Department. Classes were taught; papers and proposals written; research done; and reports, reviews, and committee work accomplished. Here follow some of the highlights.

Physics and Astronomy students excelled as usual! We were especially proud that one of our graduating seniors, Emily Day, received the College of Arts and Science's 2006 Carl Albert award. (She won the Department's Fowler Prize as well.) Seniors graduated and went on to graduate schools or exciting jobs and several of our graduate students defended theses and went on to jobs or post-docs. And then a new term arrives and we always have the privilege of welcoming new undergraduate majors and new graduate students.

Our external funding for FY2006 topped out at \$4.24M, a new record. This figure reflects the cumulative effort of individual faculty and is composed of both large group grants as well as single- and few-investigator grants. Of course, it is not the money itself that counts but the vigorous research programs that it represents!

Once again, substantial salary increases for faculty averaging nearly 10% were announced last summer. And once again these were made possible by the magic of President Boren, who convinced the OU Foundation to acquire a stake in faculty salaries.

We were very pleased to get the green light from Dean Paul Bell to begin a search for an occupant of the Homer L. Dodge Chair in Astrophysics. The search is progressing well and we hope to announce the result in the next newsletter. This Chair and the

future Chairs in High Energy Physics and in Atomic, Molecular, and Chemical Physics are made possible by the gift of \$6M by the Avenir Foundation announced in 2005.

A second result of the gift is also in the beginning stage. Phase III of the Nielsen Hall Addition and Renovation project is starting! In this phase, the old 1948 building will be renovated. A new roof will be installed, teaching labs moved and renovated, new research space carved out, and the public areas of the building beautified.

So the march of progress in the Department continues. The passing of time also brings changes that are difficult to accept. The loss of Prof. George Kalbfleisch last September is such a change. Although he had formally retired ("from teaching") in 1999, George continued to work daily on his research and with his presence and interest to be a part of the Department. We miss him.

As always, dear friends and alumni, we wish you the best and hope to hear from you!

-Ryan Doezema

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George Kalbfleisch (1931-2006)

The passing of George Kalbfleisch, on the 12th of September, 2006, saddened us all. George was a cornerstone to the Department from his arrival in 1979 to the day he left us. We miss the high standards he set for the Department, his creative input into all the physics he touched, and his kindness to students and faculty alike. Our thoughts are with him and his family.

The following official APS obituary was written by Kim Milton.

George Randolph Kalbfleisch, 75, discoverer of the η' meson and founder of the high-energy group at the University of Oklahoma, died September 12, 2006, in Norman, Oklahoma, of complications resulting from Lewy-Body disease.

George Kalbfleisch was born March 14, 1931 in Long Beach, California, to Friedrich Carl and Hildegard Kalbfleisch. He graduated from Phineas Banning High School, Wilmington, California, in 1948, graduating on time in spite of losing his junior year to rheumatic fever. He received his BS degree in chemistry from Loyola University, Los Angeles, in 1952. On October 23, 1954, he married Ruth Ann Adams in San Pedro, California. After working a few years as a chemist for Hunt Foods and Hales Laboratories, George realized that his real love was physics, and he became first a technician and then a graduate research assistant at Lawrence Radiation Laboratory in 1957. He received his Ph.D. in experimental High Energy Physics in 1961 from the University of California at Berkeley under the direction of M. Lynn Stevenson, studying K-meson production in $p\bar{p}$ collisions. By that point he already had 7 publications, mostly on hyperon production and decay. George continued in Luis Alvarez' group at Berkeley as a postdoctoral associate until 1964. His work there culminated in his discovery of the ninth member of the

pseudoscalar nonet of mesons, the η' . He then moved to Brookhaven National Laboratory, where he received tenure in 1968, where his publications show him still unraveling hyperonic and mesonic properties. Less conventionally, he also published a search for tachyons, and compared muon and neutrino velocities in a test of special relativity. He stayed at Brookhaven until 1976, then moving to Fermilab for three years, where he worked on the development of superconducting quadrupole magnets for the Tevatron.

George Kalbfleisch was recruited to the University of Oklahoma (OU) in 1979 with the intention of establishing a High Energy Physics group. This he succeeded in doing, by hiring several new faculty in both experiment and theory over the next decade, and by securing stable funding from the Department of Energy which continues to this day. At OU he developed the silicon microstrip detectors used by the DØ collaboration at the Tevatron. He was elected as a Fellow in the American Physical Society in 1982. In 1990 he established a sister High Energy Physics group at Langston University, a traditionally Black college in Oklahoma. He was a consultant for the SSC until that project was canceled in 1993. In 1999, Dr. Kalbfleisch retired from teaching, although he continued conducting research until a few weeks before his death. In fact, George was working hard in his office and discussing physics with his colleagues the day before his final illness.

In 2001, he was the first physicist inducted into the inaugural Alumni Wall of Fame at his alma mater, Loyola Marymount University, in honor of his lifetime achievements. His research at OU included the study of charm and beauty quantum states at Fermilab as part of the DØ collaboration and of neutrino properties in-house at OU. In 1995 he proposed that the old CDF and DØ detectors at the Tevatron be cut up and run through an induction detector to search for any magnetic monopoles that might have been produced at Fermilab. He was inspired in this by his mentor Luis Alvarez, who had used a similar detector to look for monopoles in moon rocks. He and his group at OU finished the search for low mass accelerator-produced magnetic monopoles (Fermilab experiment E-882) in 2004. In the last few years, he worked on an experiment to detect the electric dipole moment (EDM) of the electron at OU, principally in collaboration with Neil Shafer-Ray.

George Kalbfleisch published more than one hundred and ninety articles in elementary particle physics, and was an inspiration for all those around him. He had two graduate students work with him at OU on in-house experiments: Moustafa Bahrán, who worked on the experimental refutation of the short-lived 17 keV neutrino, is now the science advisor to the President of Yemen; and Wei Luo, whose thesis was determining mass limits on magnetic monopoles from the DØ/CDF detectors, now works on medical research at the Fox Chase Cancer Center in Philadelphia.

George was a wonderful family man. He is survived by his wife of 52 years, Ruth Ann and his four children Karen, George, Jr., Julie, and Carl, and five grandchildren. He enjoyed tracing the genealogy of his family, and was able, after the fall of the Berlin wall, to track down a number of his German relations. He was a tireless supporter of the University of Oklahoma, and of its football team. He will be sorely missed.

-Neil Shafer-Ray

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Distinguished Alumnus Retires From NASA

Jerry C. Elliott's career has spanned 41-years of dedication, achievement and awards. But most of his career began very quietly in 1966 when he joined NASA in the NASA Manned Spacecraft Center (now NASA Johnson Space Center). He was soon promoted from a Flight Mission

Operations Engineer to a Guidance Engineer and Flight Controller for the Agena spacecraft during the Gemini space program and has held many high-level technical and program/project manager's positions in all fields of NASA's operations from spacecraft systems to national and regional counterterrorism and physical security.

Jerry graduated in Physics from the University of Oklahoma and was awarded the Presidential Medal of Freedom (Richard Nixon), the highest civilian honor in the nation, for his work as Trajectory Engineer/ Flight Dynamics Retrofire Officer in the Mission Operations Control Room during Apollo 9, 10, 11, 12, 13, 14, 15, and 16 in Earth orbit and lunar missions. It was his success in the safe-return trajectory of the Apollo 13 crew back to Earth that earned him the Presidential recognition.

In addition, Elliott created three technology inventions, wrote the Space Act Agreement between NASA and the U.S. Dept. of Air Force and with NASA and Senator Max Baucus in the funding and assistance to seven Indian tribes in Montana for economic development. In his last duty, he served as Senior Technical Advisor, Management Integration and Planning Office of the Space Station Program Office and as a side duty Chief Editor of the Space Shuttle Program News.

Elliott also wrote numerous training courses and was given many Group Achievement Awards, Navajo Medal of Honor, Cherokee Medal of Honor, the Ely Samuel Parker Award, and a NASA Special Achievement Award.

..Contributed by Cheerie Patneau,

NASA White Sands Test Facility

Research Activities

- Here is a sampling of some of the research activities currently taking place in the Department.

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Eddie Baron: This summer Baron, Branch, and postdoc David Jeffery attended a one week conference *The Multicoloured Landscape of Compact Objects and their Explosive Origins* in Cefalu, Italy. Baron and Branch gave invited talks and Jeffery gave a contributed talk. Baron attended Type Ia Supernovae Workshop in Chicago in September where he gave an invited talk and his long-time collaborator Peter Hauschildt also attended and then spent a week at OU. Baron visited Peter in Hamburg, Germany, the second week of January.

David Branch: We are continuing our comparative study of spectra of Type Ia (thermonuclear) supernovae, described in the summer 2006 Phlyer. Paper III in the series, on spectra obtained before the time of maximum brightness, exists in manuscript form and will be submitted in February or March, 2007. The authors will include OU undergraduates Michael Troxel, Jerod Parrent, Nicholas Hall, and Wesley Ketchum; summer REU students Leeann Chau Dang (Whitman College) and Miriam Musco (Indiana); grad student Darrin Casebeer; former grad student Kazuhito Hatano; Visiting Research Scientist David Jeffery, and Eddie Baron. We also have been looking into the possibility that the spectra of Type Ic (core-collapse) supernovae have been misinterpreted, and that contrary to popular opinion they eject some hydrogen. The most recent paper, to appear in print in February, 2007, is first-authored by Parrent. Others involved include Troxel, Ketchum, Casebeer, Jeffery, Baron, and two colleagues at Berkeley.

Sheena Murphy: Sheena Murphy is a co-PI on a new 3-year NSF ADVANCE award to promote the recruitment and retention of women in the academic ranks, specifically in science, technology, engineering and mathematics (STEM). The Steering Committee for the OU Advance grant grew out of the College of Arts and Sciences' Dean's Advisory Committee on Women's Issues. The OU ADVANCE project seeks to promote institutional change for faculty diversity on campus and in the central states. Our Physics and Astronomy Department is well suited to be a player in such a program, as it has been recognized as one of only 21 physics departments nationwide with 4 or more female faculty members.

The project has a number of components. On-campus activities will include search committee chair training and leadership development workshops. The group has already held a holiday reception for dual academic career couples (an informal survey indicated that there were over 60 such couples within OU) and the first of their Distinguished Speakers Series, featuring Professor Ruth Okediji, William L. Prosser Professor of Law and Solly Robins Distinguished Research Fellow of the University of Minnesota. Her lecture entitled "Negotiating Success: Gender, Leadership and the Academic Culture" was well attended, and bodes well for local interest in future events.

The centerpiece of the project is the first Big XII Biennial Workshop on Faculty Recruitment, Retention and Leadership, which the group will host in Fall 2007. Each Big XII school will be invited to send a team consisting of both administrators and faculty to work on improving faculty diversity on their home campus. This will provide an opportunity to showcase programs at OU and to disseminate information about "best practices" from other institutions that are previous NSF ADVANCE awardees.

Outreach activities round out the project. Sheena has been involved in planning one of the larger events, a "Women in Science Day" at the OKC Omniplex geared towards students in grades 7-12 and run by the OK state EPSCoR office. Panelists representing physical sciences, biological sciences, and agricultural/environmental sciences will hopefully give these young students the take home message that "math is key to a science career". The hope is to have 400-500 young scientists

participate.

The ADVANCE project has been supported locally by Dean Paul Bell, College of Arts and Sciences, Dean Thomas Landers, College of Engineering, Provost Nancy Mergler and Vice President for Research, Lee Williams, in addition to the State EPSCoR office. The program welcomes all alumni(a) to participate in upcoming events. More details can be found at www.ou.edu/advance.

Kim Milton: I've been working with my three students, K. V. Shajesh, Prachi Parashar, and Jeff Wagner on a number of different research problems: developing a nonperturbative theory applicable to magnetic monopoles, constructing a consistent quantum electrodynamics which is not Hermitian but is invariant under space and time reflections (PT symmetry), and studying aspects of quantum vacuum energy (Casimir effect). On the latter front, we are writing a paper answering the question, How does Casimir energy fall?, with the answer that just like other forms of matter the equivalence principle holds. I now have an NSF collaborative grant (with Steve Fulling of TAMU) that supports our research on the Casimir effect, in addition to continuing DOE support. My former student Ines Cavero-Pelaez has just started a postdoc job at Laboratoire Kastler Brossel, ENS, Univ. Paris VI, CNRS, Paris (whew, that's quite a label).

Dick Henry: While on sabbatical in the fall I spent much of my time working on understanding the chemical evolution of damped Lyman alpha systems, highly redshifted galaxies which absorb light from bright background quasars. In a project with Jason Prochaska of Lick Observatory, we constructed detailed chemical evolution models of 30 such objects using Jason's abundance measurements of N, Si, Fe, and S in each for constraints. One of our goals is to understand the star formation characteristics of DLAs as well as their evolutionary ages. In planetary nebula research, Julie Skinner, senior astrophysics major, is working on a detailed photoionization model of DDDM1, an object which we recently observed using the Spitzer Infrared Space Telescope. At the same time, Henry Bradsher, another UG astrophysics senior is working with me to improve methods for converting spectral measurements to reliable oxygen abundances and in turn using the results to study the oxygen abundance gradient in the Milky Way disk. Finally, graduate student Aida Nava has been busy computing models of H II regions surrounding star clusters of different ages in an effort to study the efficiency of mixing of stellar debris with existing nearby nebular material.

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Graduating Students:

Taroshani Kasturiarachchi, whose dissertation was co-directed by Ryan Doezema and Mike Santos, defended in December.

Larry Maddox, a student of John Cowan's, received his PhD during the summer. He is now working at the University of Illinois at Urbana as a postdoc.

Snow Day!

Nature decided to blanket the campus with a beautiful layer of snow on November 30, 2006. The University was closed, quiet prevailed, and we all imagined we were in New England. As usual, this illusion was short-lived. Melting was swift and complete within days. The picture below shows the west section of Nielsen Hall.





460 copies of this publication, printed by the Physics and Astronomy Department, have been prepared and distributed at a cost of \$155.52 to the taxpayers of the state of Oklahoma.

