

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

# ΦYAST ΦLYER

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

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## BRAD ABBOTT AND THE D0 PROJECT

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by Mike Strauss

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Brad Abbott has been the co-convener of the D0 (D-Zero) B physics group for almost two years. The D0 detector is one of the two large detectors at the Fermilab Tevatron, which is currently the highest energy particle accelerator in the world. The B physics group is responsible for using this detector for studying the properties of b quarks produced in p-pbar collisions at the Tevatron. Currently there are over 15 graduate students and numerous post-docs and professors working on analyses in this group. Organizing and directing this many people, as well as keeping track of various analyses, keeps Brad quite busy.



Brad Abbott during a restful moment outside of Nielsen Hall.

During the past two years the experiment has undergone a transformation from building and commissioning the upgraded detector to producing high

quality physics results. For the next few years the Tevatron will be the only laboratory in the world capable of doing the kind of analysis done by Brad and his colleagues in the B physics group, which makes this an exciting time to be working at the D0 experiment.

Ultimately, the B physics analyses from D0 may help discover the source of CP violation, one mechanism for producing the matter-antimatter anisotropy of the universe, or find evidence for particle-antiparticle mixing in the B sector.

Current B physics results from D0 were recently presented at the APS/DPF conference in Philadelphia. These results included a measurement of the B lifetime, and observations of exclusive B decays and cross sections.

Brad recently presented a seminar at Fermilab which covered many of the recent B physics results from D0, as well as D0 analyses covering Quantum Chromodynamics, Electroweak and Top physics, and searches for the Higgs particle.

The detector is continuing to collect data, and as the size of the data set increases the D0 collaboration expects more exciting results. Measurements of CP violation, B mixing, and rare B decays may place tight constraints on the Standard Model of particles and fields, and may lead to incredible new insights into the structure and origin of the universe.



## NIELSEN HALL EXPANSION

by Ryan Doezema

The second addition to Nielsen Hall is about to be built! Formally known as "Phase II," the addition is the second of three steps in renovating and expanding our teaching and research facilities. Phase I, the beautiful teaching addition to the west of old Nielsen Hall, was completed in spring 2000. The final phase will be the complete renovation of old Nielsen Hall, built in 1948.

Phase II will be connected to the south side of old Nielsen Hall, facing the South Oval. The walkway between Nielsen Hall and Gittinger Hall will be preserved as will a green space between the two buildings bounded by Phases I and II on the west and east.

The new addition will have three floors and a basement. All four levels will be connected to the old building by hallways running north/south just to the east of the elevator shaft in the old building. The basement will provide new space for our "junior lab." It will also contain a large mechanical unit to furnish "make up" air to basement laboratories to replenish air exhausted by fume hoods. The other three floors will provide 30 faculty offices and 3 small conference rooms (one per floor). The addition will be separated from the old building by an atrium, which will have a Foucault pendulum and space for our daily tea.



Nielsen Hall was built in 1946 and was named after Jens Rud Nielsen (1894-1979) at his retirement in 1965. The view is to the SSW; Purcell is completely invisible in the background.

Moving faculty offices out of old Nielsen Hall will permit space reallocation, mostly for research. The ultimate conversion will take place when Phase III is funded, but already in Phase II some improvements in addition to providing "make up" air will take place. Fire protection sprinklers will be installed in the entire old building. Also new mechanical units to provide heat and air to the old building as well as to the new office addition will take the place of the current units. The second-floor library will expand by about 75%, a new seminar room suitable for video conferences will be constructed on the first floor, and each floor will have 2 new post-doc offices.

The construction of the addition is scheduled to be completed in less than a year and the improvements to old Nielsen Hall should take less than 3 months. So we are hopeful Phase II will be finished by the start of the 2004/2005 academic year!

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## ALUMNI NEWS

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From Tom Miller:

A recent paper submitted to the *Journal of Chemical Physics*, "The Reaction  $\text{HCl}^+ + \text{CF}_4 = \text{HCF}_4^+ + \text{Cl}$ : Implications for the Heat of Formation of  $\text{CF}_3^+$ ," by Eldon Ferguson, Tom Miller and Al Viggiano resulted from a collaboration involving two former OU physicists. Eldon received his PhD with J. Rud Nielsen in 1953. Tom was a professor at OU from 1978 to 1994. Viggiano received his PhD with Eldon at the University of Colorado

in 1980 and presently directs the Plasma Chemistry Laboratory at the Air Force Research Laboratory outside Boston, where the research was carried out.

The paper resolves a long-standing controversy over the ionization energy of carbon tetrafluoride. The problem arises because of the drastic geometry change that results when tetrahedral  $\text{CF}_4$  is ionized, yielding planar  $\text{CF}_3^+$  plus a free F atom. ( $\text{CF}_4^+$  itself is not stable.) Conventional photoionization or electron impact thresholds give vertical ionization energies rather than the thermochemical adiabatic value.

This paper represents more than 50 years of *Journal of Chemical Physics* publication for Eldon going back to his thesis research papers from OU. The dominant technique world wide now for ion-molecule interaction studies is the "flowing afterglow" method developed at the then NBS in Boulder, Colorado in 1965 by Eldon and two of his PhD students from the University of Texas where he was professor from 1957 to 1962. The Boulder group used the FA to elucidate the ion chemistry of the earth's ionosphere. It has subsequently been applied to a number of astrophysical problems and to basic studies of reaction mechanisms, thermochemical problems, organic chemistry, and to very sensitive trace gas detection in medical and environmental situations. *Chemical Abstracts* shows 1082 references on "flowing afterglow," from Eldon's original 1965 papers to recent ones from all laboratories.

The exact reference for Eldon's article is: J. Chem. Phys., 118, 2130 (2003).

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Recalling Prof. Richard Fowler and the Department, from Don Williams:

Dr. Fowler had a significant impact on my life at the University and subsequently, just because of his pragmatic approach and kind nature.

When I was there there was an club called "The Engineering Physicists Club," or something like that. About midway through my years there he said to me

"Don, some day you are going to be president of this club," and he turned out to be right.

I was also managing editor, then editor, of the *Sooner Shamrock*, the Engineering magazine. That was interesting because if you were in Engineering Physics, you were sort of an outcast from the hard-hat engineers, but there I was.

Dr. Fowler also gave me a full \$1.00 per hour to work on a Naval Research Laboratory contract he had, and that was twice the going rate at the time.

I also worked for Dr. Neilsen, designing and building some test equipment for his research on Raman Spectroscopy. [I'm probably one of the few with a real semester hour credit in laboratory glassblowing]. I also taught undergraduate Physics lab.

Finally, I had full access to the Physics machine shop, and did modifications to my cameras, etc.

Dr. Fowler also wrote a textbook on Physics, I think for undergraduate students, possibly for non-physics majors. I have tried to find a copy but have been unsuccessful. I wanted it just as a memento. It was in the listing at the UCSD Engineering library but was missing when I tried to get it, probably stolen.

I see that astronomy has been added to the department name. Turns out that after I did my Navy tour I went into industry and got an M.S. from UCLA. My thesis was on a Radio Astronomy research project I did with a large antenna in the Southern California desert. Subsequently I was invited to work in The Netherlands on what was then called the Benelux Cross Antenna Project, for their equivalent of our National Science Foundation.

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We have received the following sad news from James Cafky:

"I offer this information in an attempt to distribute sad news to fellow alumni regarding Oliver S. Spencer, Ph.D., 1968, who died of cancer November 17, 2002. As a graduate student, Oliver Spencer was the third recipient of the Nielsen Award for graduate research. I shared indentured servant status with Ollie during that time and applauded the award. Prof Colin Plint was Ollie's Major Professor. Spencer had a long and credible career in various roles as research scientist at IBM after departing OU. We who were counted among his friends during those years at OU realize at his death how much we treasured then the experience of, and now treasure the memory of his enjoyment of life."

Ollie's partner, Mrs. Rosemary Spencer, lives at:  
9819 Montyville Drive Manassas, VA 20111

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### IN THEIR DEFENSE

Fred Brown defended his dissertation, "An Investigation of the Properties of InSb/AlInSb Quantum Wells," on Sept. 18. Fred was Ryan Doezema's student. He's now with Boeing in Midwest City.

In April, Bret McKinney defended his thesis titled "Many-body dimensional perturbation theory for quantum confined systems with a focus on atomic Bose-Einstein condensates." Brett was a student of Deborah Watson, and now is a postdoc at Vanderbilt University.

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## **EXPLORING SOME OF THE SOLAR SYSTEM'S SMALLEST OBJECTS**

By Bill Romanishin

In grade school, you learned that the solar system consists of nine planets, some rocks called asteroids, and icy bodies called comets. In the past decade or so, astronomers have found another substantial group of objects in the solar system - the Kuiper Belt Objects (KBOs). KBOs are primarily found in the outer regions of the solar system disk, out past Neptune, in the general region covered by the orbit of Pluto.

So what are KBOs? At present, we think they are some sort of icy bodies, probably related to comets. Astronomers have found at least 700 KBOs so far, out of perhaps billions that exist, and each month more are found. The largest known KBO is about 1200 kilometers in diameter - larger than the largest asteroid, and half the diameter of Pluto. Perhaps KBOs larger than Pluto remain to be found - will we then have more than 9 planets, or should we demote Pluto to KBO status and have 8 planets?

The first asteroid was discovered in 1801, but the first KBO wasn't found until 1992. Why? Like asteroids, KBOs in the optical are only seen by reflected sunlight. Because of their much larger distance from the Sun and earth a KBO is much fainter than a similar sized asteroid. Advances in telescopes, detectors, and lots of sleepless nights on the part of astronomers were needed to finally start finding KBOs.

For the past 7 years, Steve Tegler (Northern Arizona University) and I have been studying KBOs. We use large telescopes in Arizona and Hawaii to take images of KBOs, using CCD detectors and colored filters. By comparing the brightness of a KBO in different filters, we can measure its color. Why measure colors? Well, to be honest, these objects are so faint that it is difficult to do much else. We would much rather take spectra of the KBOs, which are usually more physically diagnostic of astronomical objects than are colors, but these objects are too faint to get usable spectra, and the few spectra that exist basically just show reflected sunlight.



**Bill Romanishin (right) and collaborator Steve Tegler (N. AZ. U.) relax before another night of photon-gathering.**

The highlight of this research has been my five trips to the Big Island of Hawaii to use one of the twin Keck 10 meter telescopes, the largest optical telescopes in the world. I don't particularly enjoy going to Hawaii to work (everyone else on the plane seem to be honeymooners or seniors with their golf clubs). Observing is often stressful sometimes things go wrong- often weather, sometimes equipment. The worst stress is making a mistake that wastes precious telescope time, when you realize that one second of Keck time is worth about \$1.25, or about \$50,000 per night!

After 120 nights on various telescopes, we have accurate colors for about 100 KBOs. We find that, in general, KBOs come in two colors- gray, which

essentially reflect all wavelengths of sunlight equally, and very red, which appear to absorb more of the blue sunlight than the red sunlight.

This is saying something about the surfaces of the various KBOs, but at present we don't know what! We are now getting enough objects of different

KBO subgroups to hope to be able to say anything useful. The most important result so far is that the "classical KBOs" - those on circular orbits well past Neptune- are all very red.

Besides colors, our data are useful for constraining the sizes and shapes of KBOs, and for refining their orbits so that they don't get lost in space. Steve and I are part of a team of astronomers who have used the Hubble Space Telescope to discover 3 of the 8 known KBO binaries, or "double KBOs". Future study of these binaries will help pin down KBO masses and densities. Our work on colors and shapes has resulted in three publications in the journal NATURE, as well as others in the astronomical literature, and has been supported financially by NASA and OU.

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## **COLD ATOM RESEARCH**

by Deborah Watson

For the past five years my group in theoretical atomic physics has been studying very cold collections of rubidium-87 atoms. These atoms are trapped in the laboratory using magneto-optical traps and cooled using lasers and evaporative cooling techniques to temperatures within .000001 of absolute zero. Since rubidium-87 atoms are bosons, such cold temperatures result in a collapse of the atoms from a distribution of many quantum states into a single quantum state, the ground state of the harmonic trap confining them. With identical quantum wavefunctions that overlap, these atoms act as a coherent quantum matter wave.



Deborah Watson, shown here testing the strength of hyperspace.

Many condensates in laboratories today are dilute enough to describe using simply a mean or average potential. Our group is interested in condensates that are denser or have stronger interactions which require that every two-body interaction be accounted for exactly. We would like to describe the breakdown of the mean-field approximation since this will help to elucidate the microscopic dynamics of condensates and should help to bridge the gap between dilute condensates and the regime of superfluidity/superconductivity where strong interactions make first-principle treatments difficult. Since most condensates have a million or more atoms today, this results in  $10^{12}$  interactions. I am happy to report that my group has found a way to keep track of all  $10^{12}$  interactions without significantly lengthening the time for a graduate student to get a Ph.D. We take advantage of the high degree of symmetry in a condensate to determine the effect of all  $10^{12}$  interactions on ground state energies and excitation frequencies. Most of our work is done using paper and pencil instead of computers, and we readily admit to using more than our fair share of paper and pencils from the office supplies. I am fortunate to have graduate students that write very small. After several years of effort (and three small papers) we are in the process of publishing two or three large papers on our method and initial results. The first paper will be published in *Annals of Physics* because of its broad applicability to any many-body system under quantum confinement such as quantum dots, atoms, optical lattices as well as Bose-Einstein condensates.

The first student to work in this new area within my group just defended his dissertation on Friday April 25, 2003. A second student, Blake Laing is extending this work to cylindrical traps that are common in laboratories. My postdoc Martin Dunn is now trying to characterize the nature of the fundamental excitations of the condensate. This work has been funded by the Office of Naval Research.

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### **OU HEP GROUP TO HOST FALL WORKSHOP**

"QFEXT03," the Sixth Workshop on QUANTUM FIELD THEORY UNDER THE INFLUENCE OF EXTERNAL CONDITIONS, will be



held at

The University of Oklahoma September 15-19, 2003, at the OCCE Forum Building. This is a continuation of a series of workshops of the same title held at the University of Leipzig in 1989, 1992, 1995, 1998, and 2001.

#### Topics Include

# Macroscopic Quantum Effects--Theory and Experiment

\* Casimir effect

\* Bose-Einstein condensation

\* Quantum Hall effect

# Quantum Effects in Nontrivial Backgrounds

\* Kinks, vortices

# Quantum Field Theory at Finite Temperature and Density

\* Dynamics of phase transitions

# Formalism of Quantum Fields in Bounded Regions

\* Heat kernel expansions and related mathematical techniques

\* Branes, extra dimensions, and quantum cosmology

The International Advisory Committee consists of

\* Michael Bordag, University of Leipzig

\* Bodo Geyer, University of Leipzig

\* Robert Jaffe, MIT

\* Kimball Milton, University of Oklahoma \* Umar Mohideen, University of California, Riverside

\* Vladimir Mostepanenko, A. Friedmann Lab., St. Petersburg

\* Peter van Nieuwenhuizen, SUNY Stony Brook

\* Serge Reynaud, CNRS Paris

while the Local Organizing Committee is

\* Kimball Milton

\* Ron Kantowski

\* Chung Kao

\* Kieran Mullen

\* Yun Wang

Sponsors include:

\* The University of Oklahoma

o Office of the Provost

o The Vice President for Research

o The College of Arts and Sciences

- o The Department of Physics and Astronomy
- \* Oak Ridge Associated Universities
- \* National Science Foundation

Proceedings will be published by Rinton Press.

We are in the process of collecting a large number of invited and contributed plenary and parallel session talks. We hope there will be substantial participation from overseas, the State Department and WHO willing, and we are offering travel support to several leading physicists from Russia and the FSU. Thanks to NSF, we will be able to support travel by junior US participants. Keep tuned to our web page, <http://www.nhn.ou.edu/qfext03/> for late breaking details.

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## RESEARCH NEWS

### Publications

- I. Brevik, K. A. Milton, and S. D. Odintsov, "Entropy Bounds on  $R \times S^3$  Geometries, Ann. Phys., 302, 120--141 (2002).
- K. A. Milton, "Constraints on Extra Dimensions from Cosmological and Terrestrial Measurements," Grav. Cosmol., 8, 65--72 (2002).
- E. J. Lentz, E. Baron, D. Branch, and P. H. Hauschildt, "Detectibility of Hydrogen Mixing in Type Ia Supernova pre-Maximum Spectra," Ap. J., (2002), 580 374--379.
- E. Baron, P. Nugent, D. Branch, P. H. Hauschildt, M. Turatto, and E. Cappellaro, "Determination of Primordial Metallicity and Mixing in the Type IIP Supernova 1993W," Ap. J. (2003), 586, 1199--1210.
- J. P. Halpern, K. M. Leighly, H. L. Marshall, "An Extreme Ultraviolet Explorer Atlas of Seyfert Galaxy Light Curves: Search for Periodicity," 2003 ApJ 585 665.
- K.B. Kwitter, R.B.C. Henry, & J.B. Milingo, "Sulfur, Chlorine, and Argon Abundances in Planetary Nebulae. III. Observations and Results for a Final Sample," Pub. Astr. Soc. Pacific, 115, 80 (2003).
- D. Branch, K. M. Leighly, R. C. Thomas, and E. Baron, "The Spectrum of the FeLoBAL Quasar FBQS 1214+2803: A Resonance-Scattering Interpretation," ApJ, 578, L37 (2002).

S. Benetti, D. Branch, M. Turatto, E. Cappellaro,  
E. Baron, et al., "The Exceptionally Bright Type Ib Supernova 1991D," MNRAS, 336, 91 (2002).

K. Hatano, D. Branch, Y. L. Qiu, E. Baron, et al. "On the Spectrum of the Peculiar Type Ia Supernova 1997br and the nature of SN 1991T-like Events," New Astr., 7, 441 (2002)

H. Schatz, R. Toenjes, K.-L. Kratz, B. Pfeiffer, T. C. Beers, J. J. Cowan and V. Hill, "Thorium and Uranium Chronometers Applied to CS 31082-001," Astrophys. J., 579, 626 (2002)

J. W. Truran, J. J. Cowan, C. A. Pilachowski and C. Sneden, "Probing the Neutron-Capture Nucleosynthesis History of Galactic Matter," Pub. Astr. Soc. Pac., 114, 1293 (2002)

C. Sneden and J. J. Cowan, "The Genesis of the Heaviest Elements in the Milky Way Galaxy," Science, 299, 70 (2003) V. Barger, F. Halzen, D. Hooper, and C. Kao, "Indirect search for neutralino dark matter with high energy neutrino," Phys. Rev. D65, 075022 (2002).

S. Dawson, D. Dicus, and C. Kao, "Searching for the Higgs bosons of minimal supersymmetry with muon pairs and bottom quark," Phys. Lett. B545, 132 (2002).

Dipak Munshi, and Yun Wang, "How Sensitive Are Weak Lensing Statistics to Dark Energy Content?" ApJ, 583, 566 (2003).

M. Viel, S. Matarrese, Tom Theuns, D. Munshi, and Yun Wang, "Dark Energy Effects on the Lyman-alpha Forest," MNRAS, 340, L47 (2003)

B. Abbott, P. Gutierrez, M. Strauss, et.al., D0 Collaboration have published the following 12 articles:

"Search for the production of single sleptons through R-parity violation in p anti-p collisions at  $s^{**}(1/2) = 1.8\text{-TeV}$  .," Phys.Rev.Lett.89:261801, 2002.

"Improved W boson mass measurement with the D0 detector," [Phys.Rev.D66:012001,2002](#).

"A Direct measurement of W boson decay width," Phys.Rev.D66:032008, 2002.

"Search for R-parity violating supersymmetry in dimuon and four jets channel," Phys.Rev.Lett.89:171801, 2002.

"Search for leptoquark pairs decaying to neutrino neutrino + jets in p anti-p collisions at  $s^{**}(1/2)=1.8\text{-TeV}$ ," Phys.Rev.Lett.88:191801, 2002.

"A Search for the scalar top quark in p anti-p collisions at  $s^{**}(1/2) = 1.8\text{-TeV}$ ," Phys.Rev.Lett.88:171802, 2002.

"Measurement of the ratio of differential cross-sections for W and Z boson production as a function of transverse momentum in p anti-p collisions at  $s^{1/2} = 1.8\text{-TeV}$ ," Phys.Lett.B517:299-308, 2001.

"Search for single top quark production at D0 using neural networks," Phys.Lett.B517:282-294, 2001.

"Direct search for charged Higgs bosons in decays of top quarks," Phys.Rev.Lett.88:151803, 2002.

"Hard Single Diffraction in pbarp Collisions at 630 and 1800 GeV," Phys.Lett.B{531},52, 2002.

"Search for mSUGRA in single-electron events with jets and large missing transverse energy in pbarp Collisions at  $\sqrt{s}=1.8\text{ TeV}$ ," Phys. Rev. D 66,112001, 2002

" $t\bar{t}$  production cross section in pbarp collisions at  $\sqrt{s}=1.8\text{ TeV}$ ," Phys. Rev. D 67, 012004, 2003

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#### Meetings Attended

Jean Claude Chokomakoua attended the 2003 Annual Conference of the National Society of Black Physicists(NSBP) and Black Physics Students, from February 12 to February 15 2003 in Atlanta-Georgia, as well as the American Physical Society (APS) March meeting in Austin, Texas.

Bahman.Roostaei attended the APS March Meeting,  
March 3-7, Austin,TX.

Chung Kao attended the International Conference on 20 Years of SUGRA and Search for SUSY and Unification (SUGRA20), March 17--21, 2003, at the Northeastern University, Boston, Massachusetts.

Ed Baron went to the SNAP Collaboration Meeting, March 13-16, 2003, LBL, Berkeley, CA.

Ryan Doezema attended the American Physical Society March Meeting, Austin, TX.

Xiaojian Zhang attended the American Physics Society April, 2003, meeting in Philadelphia.

Karen Leighly, Darrin Casebeer, Larry Maddox attended 201st American Astronomical Society meeting, Jan 5-9 Seattle, Washington.

Aida Nava attended Eighth Texas-Mexico Conference on Astrophysics, Oct 30-Nov 1, Mexico City.

Kim Milton attended "Casimir Forces: Recent Developments in Experiment and Theory," Harvard/Smithsonian, November 14-16, 2002.

John Furneaux attended the 225th National Meeting of American Chemical Society held in New Orleans, LA, from March 23th to 27th, 2003

Dick Henry attended the meeting on the Origin and Evolution of the Elements, Feb. 16-21, Carnegie Observatories, Pasadena.

John Cowan attended the workshop on Nuclear Astrophysics at the Limits of Stability, 2002 Fall Meeting of the Division of Nuclear Physics Meeting of the American Physical Society, East Lansing, MI (October 2002). He also participated in the JINA Workshop on The r-process -- New experimental, theoretical and observational opportunities, Gull Lake, MI (October 2002); the Third International Conference on Fission and Properties of Neutron-Rich Nuclei, Sanibel Island, FL (November 2002); and The Origin and Evolution of the Elements, Pasadena, CA (February 2003).



### **Presentations**

Jean Claude Chokomakou spoke at the 2003 Annual Conference of the National Society of Black Physicists(NSBP) and Black Physics Students on "Exotic Ferromagnetism in two dimensional electronic system." He also gave a talk on "Ising Quantum Hall Ferromagnets in InSb Quantum Well" at the APS March meeting in Austin.

Chung Kao spoke on "Discovering Higgs bosons of Minimal Supergravity with Muons," at the International Conference on 20 Years of SUGRA and Search for SUSY and Unification (SUGRA20).

Yun Wang gave an invited seminar titled "Dark Energy Search Using Type Ia Supernovae," University of Michigan, Jan 2003.

Dick Henry gave an invited talk on "Element Yields of Intermediate-Mass Stars," Feb. 19, at the conference on Origin and Evolution of the Elements, Carnegie Observatories, Pasadena. He also presented a colloquium on "The Cosmic Origin of Nitrogen," March 26, at Northeastern State University.

Bahman Roostaei presented a paper by Kieran Mullen and himself titled "Polarization Transition of Interacting Quantum Rings," at the March APS meeting.

John Furneaux presented the poster "Structural Investigations of Crystalline and Solution Phases of the Monoglyme:LiSbF<sub>6</sub> System," Varuni

Seneviratne, John Furneaux, and Roger Frech, at the 225th National Meeting of American Chemical Society held in New Orleans, LA, from March 23th to 27th, 2003.

Ed Baron presented the talk: "Supernovae as Cosmological Probes," Colloquium at Oklahoma State University, Oct., 2002. He also presented "An Introduction to the Spectral Fitting Expanding Atmosphere Method (SEAM)," Talk at SNAP Collaboration Meeting, Berkeley, CA, March 29, 2003.

Ryan Doezema presented: "THz Spectroscopy of InSb Quantum Wells," Colloquium at U. Arkansas, Fayetteville, AR, January 28, 2003.

Karen Leighly's group presented the following posters at the AAS meeting in January in Seattle: "An XMM-Newton Observation of the Bright Seyfert 2 Galaxy NGC 6300," L. A. Maddox, K. M. Leighly, A. Nava, C. Matsumoto, D. Grupe; and "Dependence of emission line ratios and strengths on the spectral energy distribution," D. Casebeer and K. M. Leighly; "HST and Chandra Observations of Quasar PHL 1811," K. M. Leighly, J. P. Halpern, E. B. Jenkins.

Aida Nava, Larry Maddox, Chiho Matsumoto, Karen Leighly, D. Grupe presented the poster "An XMM-Newton Observation of the Bright Seyfert 2 Galaxy NGC 6300," Oct. 30-Nov 1, at the Eighth Texas-Mexico Conference on Astrophysics, Mexico City

Xiaojian Zhang presented "Study of opposite side B flavor tagging at D0," April 5, 2003, at the APS Philadelphia meeting.

Kim Milton presented "Calculating Casimir Energies in Renormalizable Quantum Field Theory," Harvard/Smithsonian workshop listed above; also at Stanford Linear Accelerator Seminar on December 5, 2002, and at Washington University on April 3, 2003.

John Cowan presented four talks recently: "The r-Process: Observations, models and unresolved issues," at the Workshop on Nuclear Astrophysics at the Limits of Stability; "The r-Process, stellar abundances and ages, and unanswered questions," at the JINA Workshop on The r-process -- New experimental, theoretical and observational opportunities; "R-Process Abundance Signatures," at the Third International Conference on Fission and Properties of Neutron-Rich Nuclei; and "Advances in r-Process Nucleosynthesis," at the workshop The Origin and Evolution of the Elements, Pasadena, CA.

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### **Grants News**

Chung Kao (P.I.) and the High Energy Physics Group "Searching for Higgs Bosons and New Physics at Hadron Colliders," U.S. Department of Energy EPSCoR State-DOE Laboratory Partnership Award, \$450,000 for 3 years (Fall 2003-Summer 2006)

K. A. Milton, "Nonperturbative Quantum Field Theory," US Department of Energy, \$97,000

K. A. Milton, "Quantum Field Theory Under the Influence of External Conditions," National Science Foundation, \$5000

K. A. Milton, "Quantum Field Theory Under the Influence of External Conditions," Oak Ridge Associated Universities, \$5000

C. Matsumoto, K. M. Leighly, T. Kawaguchi, "Study of the UV-X-ray Properties of Luminous Narrow-line Quasars," NASA XMM-Newton Cycle 2, \$56,406.

T. Kawaguchi, K. M. Leighly, C. Matsumoto, "PG 1448+273: The hottest Accretion Disk Among Active Galactic Nuclei,"  
NASA XMM-Newton Cycle, \$28,999.

K. M. Leighly, C. Matsumoto,  
"Testing for X-ray Periodicities in Active Galaxies," NASA Astrophysic Data Program, \$25,009.

K. M. Leighly, D. Grupe, D. Casebeer, "Survey Observations of Soft X-ray Selected AGN," NASA FUSE Guest Investigator Cycle 4,  
\$63,800.

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#### Research Travel

Karen Leighly went to Johns Hopkins University, Oct 25, for a FUSE Observers Advisory Committee meeting. In addition, she went to the NASA Goddard Space Flight Center on Feb 14 to serve on a HEASARC Users Group meeting.

Jean Claude Chokomakoua and Sheena Murphy traveled to the National High Magnetic Field Laboratory(NHMFL) in Tallahassee, Florida, April 7 to April 13, to conduct a number of experiments aimed at elucidating the effect of electron density on Quantum Hall Ferromagnets in InSb Quantum Wells.

Kim Milton traveled to UCLA on September 30-October 4, 2002, to gather archival material from the Special Collections Department of the UCLA Research Library for his new book on Electromagnetic Radiation, based on Schwinger's World War II work at the Radiation Lab at MIT, but never published. He also went to Washington University, St. Louis, March 31-April 4, 2003, to work with collaborator Carl Bender on development of non Hermitian quantum field theories.

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## **Visitors Hosted**

Yun Wang hosted Bhuvnesh Jain, from Univ. of Pennsylvania. They discussed possible collaboration on weak lensing.

Sally Dawson, Brookhaven National Laboratory, visited Chung Kao, March 5-7, 2003, to work on the search for Higgs bosons at hadron colliders.

Kim Milton hosted Carl Bender, Washington University, St. Louis, October 14-18, as they worked on PT symmetric Hamiltonians. In addition, Henry Kelly, Federation of American Scientists, visited Kim on November 7 to work on science policy.

Peter Nugent was a guest of Ed Baron's on January 27-31, 2003 They worked on the use of Type II supernovae as distance indicators.

John Cowan has hosted three visitors recently: Jim Truran (Univ. of Chicago) came in January to work on several nucleosynthesis projects; Al Cameron (Univ. of Arizona) came and presented a seminar in March; and Chris Stockdale, NRL, and former graduate student returned in March to work on some radio and X-ray observations of extragalactic supernovae. Chris also presented the Nielsen Award colloquium.

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## **TEACHING NEWS**

Kim Milton writes: "This semester I have been using my Electrodynamics II class as a proving ground for the new book I am writing on Electromagnetic Radiation. In particular, based on fragmentary notes of the late Julian Schwinger, I have been lecturing on waveguide theory, variational methods, and radiation theory, subjects which have vast application. Over one hundred typed manuscript pages have resulted so far. I plan to send the completed manuscript to Springer Verlag in the summer of 2004."

Aida Nava updates us on the improvements going on at the OU Observatory: "We finally got the supports for the 8-inch telescopes at the OU observatory! Now we just have to pick the one with the right orientation so that the finderscope can be used!!!" Improvements to the Observatory will continue through the summer.

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## **SUMMER PLANS**

From Kim Milton: "I have been invited to speak on non-Hermitian, PT invariant gauge theories at the First International Workshop on Pseudo-Hermitian Hamiltonians in Quantum Physics in Prague, Czech Republic, in June, and on Casimir



Energies at the 10th Marcel Grossmann Meeting in Rio de Janeiro, Brazil, in July."

In June Brett McKinney, fresh from his thesis defense in April, will start work at Vanderbilt University as a postdoctoral fellow in bioinformatics and biomathematics.

Concerning her summer plans, Karen Leighly says, "Some people may remember Toshihiro Kawaguchi - he was a student from Kyoto University who visited OU for 5 months in summer and fall 2000. During the time he was here, we wrote a proposal for observing time using the XMM-Newton X-ray satellite. Our proposal was successful and the object was observed in early February this year, so Toshi plans to return for 1.5 months this summer to analyze the data. Toshi is now a postdoc at the Meudon Observatory in France."

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**CONGRATULATIONS STUDENTS, FACULTY!!!**

**Members of the Department received the following awards this spring.**

**FACULTY**

**Presidential Professorship**

Mike Santos

**Jr. Faculty Research Award**

Lloyd Bumm, Chung Kao

**STUDENTS**

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**2003 Nielsen Prize**-Rollin Thomas

**2003 Fowler Prize**-Carl Frederick Carlsson

**2003 Karcher Awards**- Santosh Niranjana Shah, Daniel Joshua Stark, Jack Allen Franklin

**Awards In Engineering Physics**

**Roy B Adams Scholarship**

Reeves,David

**Cuba & Ted Webb Scholarship**

Basset,Gareth

**J Clarence Karcher**

Deen,David  
Harwood,Stanton  
Morgan,Jordan  
Nguyen,Tuan

**Pat on The Back**

Bares,Christopher  
Bottoms,Karen  
Chong,Jer Min  
De Berry,Butch  
Ehrhart,John  
Franklin,Jack  
Graham,Jeremy  
Hewitt,Matthew  
Hoggan,James  
Howell,Douglas  
Marshall,Aaron  
Mc Combs,Devin  
Mc Guffey,Christopher  
Nall,Timothy  
Oathout,Nathan  
Parry,Adam  
Schram,John  
Ulmer,Matthew Corey  
Willard,Aaron

**Awards In Physics & Astronomy**

**C. Richard Quade Scholarship**

Moore,John

**J Clarence Karcher**

Braker,Arnold  
Burns,John  
Day,Emily  
Dizikes,James

Hereford,Jaime  
Jordan,Faith  
Longenbaugh,Brady  
Mc Coy,Allison  
Miller,Mark  
Spence,Samuel  
Stark,Daniel  
Wang,Xiao Jing  
Willingham, Derek72  
Zabawa,Patrick

**Pat on the Back**

Biesemeyer,Ryan  
Brotherton,Joshua  
Burdett,Blake  
Caimano,Ryan  
Cashion,Kevin  
Childres,Isaac  
Choi,Jiehae  
Curtis,Mark  
Dribus,Benjamin  
Flinn,Waylon  
Harrison,Joshua  
Hines,Kimberly  
Hobbs,Kevin  
Jernigen,Jeremy  
Johnson,Lise  
Jones,Courtney  
Long,Melissa  
Long,Stacey  
Mc Lean,Katie  
Meek,Samuel  
Olberding,Conlan  
Porterfield,James  
Rupert,Juliette  
Russin,Timothy  
Shah,Santosh  
Stewart,David

Swanson,James  
Tchatchoua,Stephanie  
Whipple,Kyle  
Williams,Benjamin  
Wofford, Timothy

### **FALL ASTRONOMY LECTURES SCHEDULED**

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**Plan to attend the three fall public astronomy lectures and the associated Observatory openhouses (weather permitting, of course). Each lecture begins at 7:30pm in A102 Nielsen Hall. After the lecture, join us at the OU Observatory for a look through the 16" telescope or one of our many 8" telescopes. The dates and speakers for the events are:**

**Friday, September 19: Dr. Mike Corcoran (GSFC)**

**Friday, October 3: Mr. Darrin Casebeer (OU-Physics)**

**Friday, November 21: Dr. Susan Postawko (OU-Metrol.)**



A breathtaking view of OU's football stadium, including the colorful back of the jumbotron scoreboard. The stadium is partially blocked by an observatory.