

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

# PHYAST FLYER

*The Department of Physics & Astronomy*

*The University of Oklahoma*

Volume 10, Number 3 Spring, 2002 Dick Henry, Editor; Sonya Brindle, Production

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## PRESIDENTIAL PROFESSORSHIP IN PHYSICS



Thanks to the generosity of Ted and Cuba Webb, OU now has an endowed Presidential Professorship in Physics (P<sup>3</sup>). Readers may recall that the Presidential Professorship program was inaugurated in 1996 and awards faculty for both teaching and research accomplishments through a four-

year stipend. Now for the first time, OU has one designated specifically for physicists; historians need not apply. The P3 is made possible through the generosity of Ted and Cuba Webb and bears their name, The Ted and Cuba Webb Presidential Professorship in Physics. We are extremely grateful to the Webbs for their generosity, and we look forward to making our first nomination for this honor next fall!

## AWARDS, HONORS!



The Department held its annual awards ceremony on Thursday, May 2, to recognize the achievements of many of our undergraduates.

Award recipients in *Physics & Astronomy* were: Carl Carlsson for the C. Richard Quade Scholarship; John Burns, Benjamin Dribus, Kevin Hobbs, Faith Jordan, Melissa Long, Brady Longenbaugh, Randi Ludwig, Allison McCoy, Mark Miller, John Moore, Kim Overstreet II, Timothy Russin, David Stewart, Xiao Jing Wang, Patrick Zabawa, and Courtney Jones for the J.C. Karcher Scholarship; and Ryan Biesemeyer, Zachary Blankenship, Brian Brooks, Daniel Brue, Jason Bryant, Blake Burdett, Ryan Caimano, Kevin Cashion, Daryn Collie, Mark Curtis, Isaac Childres, Brendan Furneaux, Brent Hobbs, Jeremy Jernigan, Lise Aline Johnson, Katie McLean, Zoe Learner, Stacey Long, Geoffrey Lovelace, Christopher McRaven, Samuel Meek, Joseph Milton, Kyle Nosal, Braden Owsley, Juliette Rupert, Jaclyn Sellens, Santosh Shah, Daniel Stark, Amber Stephens, Melissa Stokes, James Swanson, Matthew Szabo, Kyle Whipple, and Benjamin Williams for Meritorious Performance.

Recipients of awards in *Engineering Physics* are: Jack Franklin for the Roy B. Adams Scholarship; David Reeves for the Cuba & Ted Webb Scholarship; Jeremy Graham, Ryan Grothe, Timothy Nall, and Stanton Harwood for the J.C. Karcher Scholarship; and Gareth Basset, Butch DeBerry, Karen Bottoms, John Ehrhart, Jeffrey Harwell, James Hilty, Kimberly Hines, Douglas Howell, Adam Parry, Cedric Shock, Matthew Ulmer Meritorious Performance; Kimberly Ann Hines, Samuel A. Meek, Faith E. Jordan, Patrick J. Zabawa, Blake T. Burdett for the Homer L. Dodge Award; Matthew J. Szabo, Zoe Asta Learner, John W. Ehrhart for the J. Clarence Karcher Award; Jeremy F. Graham, Daniel J. Stark, Santosh N. Shah for the Duane E. Roller Award.

Finally, four individuals received Departmental awards. Karcher Awards went to John Ehrhart, Zoe Learner and Matt Szabo. Geoffrey Lovelace was awarded the Fowler Prize. The single Department accolade given to a graduate student, the Nielsen Award, was presented to Chris Stockdale for his outstanding thesis work with John Cowan. Congratulations to all of these students for their nice work!

## **TWO STUDENTS INDUCTED INTO $\Phi$ BK**

Two graduating seniors were inducted into the OU chapter of Phi Beta Kappa on May 10. Geoffrey Lovelace, a physics student, plans to do graduate work at Cal Tech next year, while Zoe Learner, an astrophysics student, will be a graduate student in astronomy at Cornell next fall. These two students also received Honorable Mention from the National Science Foundation Graduate Fellowship Program this year. We wish Geoffrey and Zoe well and congratulate them on these special honors.

## **FACULTY AWARDS**



Along with our outstanding undergraduates and graduate students, several faculty garnered honors this spring as well.

John Cowan has become a David Ross Boyd Professor, Mike Strauss was given the Regents Award for Superior Teaching, and Yun Wang and Brad Abbott, were awarded Junior Faculty Research Program summer fellowships.

## MAIN OFFICE NEWS



After 17 years of service to the Department, Linda Christie resigned her position as Assistant to the Department Chair this spring to take a job in the private sector. Her competence and loyalty over the years have been very much appreciated by all of us. Danette Loyd, after a short departure, returned to the department in March to assume Linda's position. The other two office staff members now include Mechelle Gibson, who joined the department in November, 2001, as the Account & Budget Representative II and handles the reconciliation of the department's 50+ grants and contracts; and Sonya Brindle, who as of May 17 is Graduate and Undergraduate Programs Coordinator. Sonya comes to us from the Department of Sociology.

## MRSEC



OU was the recipient of a major research grant last year, a Materials Science Research and Engineering Center (MRSEC). These Centers are designed to support interdisciplinary research on a focused research topic. Other Centers include the Center for the Science and Engineering of

Materials at the University of California at Santa Barbara, the Center for Materials Science and Engineering at MIT, and Harvard University's Material Research Center. There are only 27 such Centers throughout the nation.

(A comprehensive list can be found at: [http://www.nsf.gov/mps/divisions/dmr/about/c\\_current\\_res.htm](http://www.nsf.gov/mps/divisions/dmr/about/c_current_res.htm) )

OU applied for the Center in collaboration with the University of Arkansas. Scientists from the two institutions came together to form the Center for Semiconductor Physics in Nanostructures, or C-SPIN. Both groups have a tradition of research in semiconductor crystal growth and characterization. The OU strengths in measuring electronic properties are complemented by the strong optical program at UA.

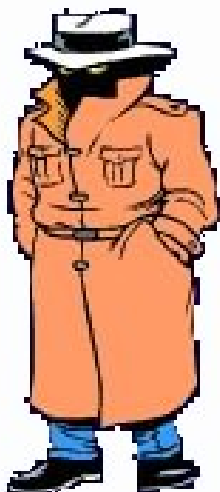
"Bringing together the different universities helps researchers accomplish far more than they could acting alone," according to Center Director Matthew Johnson, an OU Professor in experimental solid state physics. "The funding of this Center is not only a realization of the quality of our research, it reflects a commitment of the NSF to supporting research in this part of the country. And this sort of applied research is the type of work that leads to industry and more jobs."

The Center has two Interdisciplinary Research Groups (IRGs). IRG1 focuses on how to form nanostructures (features tens of nanometers across) in semiconductor systems. IRG2 studies how to make uniform semiconductor crystal layers that are flat on the scale of a single atomic layer. Both topics are important for improving the speed and performance of the next generation of sensors, lasers and transistors in semiconductor systems.

Other participants from the OU P&A department include Profs. Sheena Murphy, Kieran Mullen, Michael Santos, Bruce Mason, Ryan Doezema and Lloyd Bumm. In fact Prof. Bumm's position was directly created as a consequence of the grant. His work on molecular electronics brings a new set of skills to the group.

**MRSECRET**

Who is *MR. SECRET*?



It's not a who, it's a *what*.

The MRSEC-RET is the “Materials Research, Science and Engineering Center – Research Experience for Teachers” Program. This NSF funded program pays Oklahoma High School and Middle School science teachers to do research in nanotechnology and attend seminars during a nine-week program. The program is run by the Center for Semiconductor Physics in Nanostructures (C-SPIN), a joint research venture between the University of Oklahoma and the University of Arkansas (see article on MRSEC above). The 2001 participants were Marty Peters and Jason Rausch Yukon High School. According to Jason, “My work with the researchers at OU involving the growth and characterization of quantum dots gave me a much deeper understanding of nanoscience. With this understanding, I am much better prepared to get across both the content and excitement of research to my physics and AP physics students.” Marty was also enthusiastic about the program: “The enormously small (is this an oxymoron?) magnitude of the materials with which the researchers were working amazed me. Research can be a tedious process with many setbacks but can also be very rewarding. I am better able to appreciate the time and commitment that is put in to scientific research.” Compensation for teachers includes: a stipend of \$7,000 for the

program; a budget of \$1,000 for classroom equipment to be used at the participant’s school; and a budget to cover local research expenses. The program hosts 2-4 participants each summer. Admission is competitive; preference will be given to teachers in physics and chemistry, although all math and science teachers are welcome to apply. To learn more about the program please write to:

Mr. Secret

c/o Kieran Mullen

Dept of Physics and Astronomy

University of Oklahoma

Norman, OK 73019

Or email us at: [mrsecret@nhn.ou.edu](mailto:mrsecret@nhn.ou.edu)

Or check on the web at: <http://www.nhn.ou.edu/mrsecret>

## **NanoNet**

The state of Oklahoma was successful in its application for a Research Infrastructure Improvement Award from the NSF-EPSCoR program. EPSCoR is the Experimental Program to Stimulate Competitive Research, an NSF program designed to foster research programs in states that are traditionally under funded in the sciences. The award of \$13.5 million will be used to fund statewide initiatives in education and development run by the OK-EPSCoR office, as well as fund research programs. Frank Waxman runs the EPSCoR program in Oklahoma.

There are two core research efforts funded by the program: Functional Genomics and NanoNet: the Oklahoma Network for Nanostructured Materials. Director Warren Ford at OSU heads NanoNet. The OU side of the project is lead by Matt Johnson (Physics and Astronomy) and Daniel Resasco (Chemical Engineering). P&A participants include Michael Santos, Sheena Murphy, Lloyd Bumm and Kieran Mullen. The research areas were selected from a statewide competition. Over twenty groups from different fields made presentations on their fields. From this group a subset entered into a statewide proposal competition. NanoNet and Genomics were selected as the two areas in the state that could benefit from infrastructure improvements. Kieran and Matt played a large role in putting together the grant itself. The grant will provide funding for major equipment purchases and upgrades, such as improving the Sam Noble Electron Microscope Facility at OU. It will also fund some much need research technician lines as well as some students and postdoctoral researchers. On the state level there will be major efforts in outreach and education, faculty enhancement, and industrial development.

## **UNDERGRADUATE RESEARCH**

Just when you thought the undergraduates were clearing out...

OU P&A was successful in applying for a Research Experience for Undergraduates site grant from the NSF. This three-year grant will pay undergraduates to do research for nine weeks each summer, as well as attend lectures on current research topics and careers in physics. The grant PI's are Eric Abraham and Kieran Mullen. The department has a history of funded undergraduate research. The first site grant started in 1996, run by Maureen O'Halloran, Sheena Murphy, Bob Petry and Kieran Mullen. This is the second renewal of the project.

The department also has a Capstone program which requires a yearlong research project for all physics and astrophysics majors. Typically the program has about 20 participants, with half of them coming from OU and the rest from a national pool of applicants. They are paid \$3000 for the summer to work with a faculty mentor and to attend seminars. They also interact with a number of other REU projects on campus.

The summer culminates with a series of research presentations by the undergraduate participants.

One side benefit is the interaction between the REU and RET programs. The participating teachers also attend these seminars and meet regularly with the undergraduates.

This helps the teachers see what happens to talented students downstream in the educational pipeline and to learn about what excited these students to do research.

Kieran Mullen

## ALUMNI NEWS



Here's some news from a couple of past grads.

From Kent Berkley: "I quit college after my sophomore year and worked for a chemical plant for 44 years. I entered OU in the fall of '55 and left in June of '57. There were a lot of good friends that I've lost contact with and hoped to be able to find them on the alumni list. I still have a lot of fond memories of OU and Sequoia House and an apartment we rented near the Town Tavern, which may have had something to do with ending my



college career. Some of my best friends were Bill Barclay, Sanford Russell, Nick Tanga, Ted Day and many others. Is there some way I can get into alumni records and search?" [Alums, can you help Kent? His email address is:

[dkentberkley@email.msn.com](mailto:dkentberkley@email.msn.com). Ed.]

From Jeff Friedmann: "I like to read the newsletter and talk to Tom Miller about it now and again. We still work together, and I hope to get up his way this summer for a couple of weeks of work in his lab. I wish more alumni contacted you, as that is the part I like the most [are you paying attention, alums? Ed.], followed by the building and departmental faculty/staff updates. You do a fine job. I hope to get through OK this next year on sabbatical leave and will try to make it to Norman."

From Bob Hunter: "I wonder if any readers of the newsletter recall the Einstein sightings on campus? While a student, I worked part-time for \$0.90/hr. in the Research Institute machine shop run by Frank Maginnis. We had several interesting machinists there, but my all-time favorite was Ernst Leistner, a slightly stooped little old German with a thick accent and a fine head of flowing white hair... a clone of Albert Einstein, so help me! He was a quiet, kindly fellow, probably in his seventies, and a superb machinist, but with his eyesight failing. Yet Maginnis swore that 'even a blind Leistner was still worth any three other machinists!' Leistner was really proud of his beautifully preserved Packard sedan, but he could barely see over the hood when he drove. Many students were certain they had seen Albert himself parking that Packard in the physics staff lot or cruising the campus! When Leistner finally retired, the department let him use a desk near the battery room, where he took up a new interest... electronics. Yep, he enrolled in a correspondence course and was really excited about it. He stayed active and young at heart. One summer, I visited the swimming pool on North Campus and was amazed to see old Mr. Leistner DOING HANDSTANDS (I swear!) Off the low diving board, then dog-paddling slowly over to the ladder where he'd slowly climb out and get back in line at the diving board. The coeds loved him, even if he wasn't really Einstein! "[Also, I] wonder if I was the only fool to nearly kill himself in an undergrad physics lab, or did others learn the hard way too? Two of us were setting up the Millikan oil drop experiment with a 5,000-volt D.C. supply, using wiring with bare snap-dot type connectors. At the last minute, I noticed a wiring error, and grabbed a bare connector with each hand to swap them when my lab partner threw the switch. BAM! I started shaking my arms up and down as hard as I could, and remember hollering and exchanging stares with my partner for the longest time, as he stood there frozen. The shaking broke the connections, but my arms were throbbing, heart was beating like a rabbit's, and fingertips were cauterized with the impressions of the snap connectors. My wristwatch was found clear across the room. That evening I tried measuring my body resistance with an ohmmeter to calculate how much current I had drawn, and finally guessed that the cauterized skin had enough resistance to save me. Days later, we completed the experiment carefully and successfully. Now, at age 65, I barely glow in the dark anymore."

You can reach Bob directly at [rhunter@mn.rr.com](mailto:rhunter@mn.rr.com).

## **BOHR: THE FINALE**

You may recall from the last newsletter that an email message to the editor from Tom Miller included a website relevant to the question of the 1957 Bohr lecture at OU and how to obtain a transcript. This news in turn prompted Bob Hunter ([rhunter@mn.rr.com](mailto:rhunter@mn.rr.com)), the original perpetrator of this

Bohr business, to contact folks at the website about obtaining a transcription copy. He found out that a transcript of the lecture prepared by J. Rud Nielsen could be found in the series *Niels Bohr Collected Works*, published by North Holland/Elsevier. See Vol. 10 [*Complementarily Beyond Physics* (1928-1962)] (ed. David Favrholdt), 1999. Pp. 191-206. Copies may be obtained from the Niels Bohr Archive ([www.nba.nbi.dk](http://www.nba.nbi.dk)). According to Felicity Pors at the NBA, “The play *Copenhagen* has started quite a debate, in particular in The New York Review of Books, which I’ve been able to follow over the Web.”



## RESEARCH NEWS

### *Recent Publications (by group)*

#### SOLID STATE:

M. Abolfath, T. Jungwirth, J. Brum, and A.H. MacDonald, “Theory of Magnetic Anisotropy in  $\text{III}_{1-x}\text{Mn}_x\text{V}$  Ferro magnets,” *Phys. Rev. B* 63, 054418 (2001).

M. Abolfath, Kieran Mullen, and H.T.C. Stoof, “Massive skyrmions in quantum Hall Ferro magnets,” *Phys. Rev. B* 63, 075315 (2001).

M. Abolfath, T. Jungwirth, and A.H. MacDonald, “Mean-field theory of magnetic properties of  $\text{Mn}_x\text{III}_{1-x}\text{V}$  semiconductors,” *Physica E* 10, 161 (2001).

M. Abolfath and A. Langari, “Quantum Ferrimagnets in magnetic field,” *Phys. Rev. B* 63, 144414 (2001).

R. Khomeriki, M. Abolfath, and K. Mullen, “Solitons in polarized double-layer quantum Hall systems,” *Phys. Rev. B* 65, 121310 (2002).

S.A. Solin, D.R. Hines, J.S. Tsai, Yu. A. Pashkin, S.J. Chung, N. Goel and M.B. Santos, “Room Temperature Extraordinary Magneto resistance

of Non-Magnetic Narrow-Gap Semiconductor/Metal Composites: Application to Read-Head Sensors for Ultra High Density Magnetic Recording,” IEEE Transactions on Magnetics 38, 89 (2002).

J.C. Keay, S.J. Chung, M.B. Santos, and M.B. Johnson, “Mobility anisotropy in InSb/AlInSb single quantum wells,” M.A. Ball, Applied Physics Letters 80, 2138 (2002).

#### HIGH ENERGY:

V.M. Abazov, B. Abbott, ... P. Gutierrez, ... M. Strauss (D0 Collaboration), “Subject Multiplicity of Gluon and Quark Jets Reconstructed Using the kT Algorithm in pbarp Collisions,” Phys. Rev. D {65} 052008 (2002)

V.M. Abazov, B. Abbott, ... P. Gutierrez, ... M. Strauss (D0 Collaboration), “The Inclusive Jet Cross Section in pbarp Collisions at  $\sqrt{s}=1.8$  TeV Using the kT Algorithm,” Phys. Lett. B {525}, 211 (2002)

V.M. Abazov, B. Abbott, ... P. Gutierrez, ... M. Strauss (D0 Collaboration), “Search for Leptoquark Pairs Decaying into neutrino-neutrino + jets in ppbar Collisions at  $\sqrt{s} = 1.8$  TeV,” Phys. Rev. Lett. {88}, 191801, (2002)

V.M. Abazov, B. Abbott, ... P. Gutierrez, ... M. Strauss (D0 Collaboration), “Search for the Scalar Top Quark in ppbar Collisions at  $\sqrt{s} = 1.8$  TeV,” Phys. Rev. Lett. {88}, 171802, (2002)

V.M. Abazov, B. Abbott, ... P. Gutierrez, ... M. Strauss (D0 Collaboration), “Direct Search for Charged Higgs Bosons in Decays of Top Quarks,” Phys. Rev. Lett. {88}, 151803, (2002)

V. Barger, F. Halzen, D. Hooper, and C. Kao, “Indirect Search For Neutralino Dark Matter With High-Energy Neutrinos,” published in Phys. Rev. D65, 075022 (2002).

K.A. Milton, I.L. Solovtsov, O.P. Solovtsova, “Remark on the Perturbative Component of Inclusive Tau Decay,” Phys. Rev. D 65, 076009 (2002)

Kimball A. Milton, George R. Kalbfleisch, Wei Luo, Leonard Gamberg, “Theoretical and Experimental Status of Magnetic Monopoles,” Invited talk given at 5th Workshop on Quantum Field Theory Under the Influence of External Conditions, Leipzig, Germany, 10-14 Sep 2001, Int. J. Mod. Phys. A 17, 732-750 (2002)

Kimball A. Milton, Sergei D. Odintsov, Sergio Zerbini, “Bulk Versus Brane Running Couplings,” Phys. Rev. D 65, 065012 (2002)

ASTROPHYSICS:

Yun Wang, & Geoffrey Lovelace, "Unbiased Estimate of Dark Energy Density from Type Ia Supernova Data," ApJ, 562 (2001), L115

P. H. Hauschildt, D. K. Lowenthal, and E. Baron, "Parallel Implementation of the PHOENIX Generalized Stellar Atmosphere Program III: A Parallel Algorithm for Direct Opacity Sampling," Ap. J. (Supplements), (2001), 134, 323--330.

R. Mitchell, E. Baron, D. Branch, P. Lundqvist, S. Blinnikov, P. H. Hauschildt, and C. S. J. Pun, "Ni Mixing in the Outer Layers of SN 1987A," Ap. J., (2001), 556, 979--986.

E. J. Lentz, E. Baron, D. Branch, and P. H. Hauschildt, "NLTE Synthetic Spectral Fits to the Type Ia Supernova 1994D in NGC 4526," Ap. J., (2001), 557, 266--278.

A. Hun-Bon-Hoa, F. LeBlanc, P. H. Hauschildt, and E. Baron, "Radiative Acceleration in Stellar Atmospheres," A&A, (2002), 381, 197--208.

T. Barman, P. H. Hauschildt, A. Schweitzer, P. Stancil, E. Baron, and F. Allard, "Non-LTE Effects of Na I in the Atmosphere of HD209458b," Ap. J. (Letters), (2002), 569, L51-L54.

Branch, D. et al., "Direct Analysis of Spectra of Type Ib Supernovae," ApJ, 566, 1005 (2002)

Richardson, D., Branch, D., Casebeer, D., Millard, J., Thomas, R. C., and Baron, E., "A Comparative Study of the Absolute Magnitude Distributions of Supernovae," AJ, 123, 745 (2002)

Thomas, R. C., Kasen, D., Branch, D., and Baron, E., "Spectral Consequences of Deviation from Spherical Composition Symmetry in Type Ia Supernovae," ApJ, 567, 1037 (2002)

C. Sneden, J. J. Cowan, J. E. Lawler, S. Burles, T. C. Beers and G. M. Fuller, "Europium Isotopic Abundances in Very Metal-poor Stars," Astrophys. J. Letters, 566, L25(2002)

*Colloquia, Papers Presented*

Lloyd Bumm presented “Molecular Insulators, Wires, and Switches,” invited speaker, Joint Physics and Chemistry Seminar, Oklahoma State University, 21 Jan 2001, Stillwater, OK.

Kim Milton presented the seminar “Entropy Bounds in  $R \times S^3$  Geometries,” OU, February 20, 2002. Chung Kao presented a colloquium on “The Higgs Challenge,” and a seminar on “Indirect search for neutralino dark matter with high-energy neutrinos,” in April 2002, at the University of Kansas.

John Cowan presented two talks: 1) “Abundances and Ages of the Oldest Stars,” University of North Carolina, Chapel Hill, NC (March 2002); and 2) “Neutron-Capture Elements Abundances in Halo Stars and the Age of the Galaxy,” MIT, Cambridge, MA, in April 2002.

Yun Wang presented “Probing Dark Energy With Type Ia Supernovae,” at Columbia University in March, 2002, and the University of Florida, April, 2002; and “Probing Fundamental Physics with Cosmological Data,” University of Texas at Dallas, Feb., 2002.

Ed Baron recently gave the following talks: 1) “Measuring Cosmological Parameters with Type II Supernovae: Calibration of SN 1987A,” Center for Simulational Physics Seminar at University of Georgia, Dec., 2001; 2) “Understanding Spectra of SNe Ia,” seminar at ENS-Lyon, Lyon, France, Jan., 2002; and 3) “Parallelization Strategies for ALI Radiative Transfer in Moving Media,” at meeting on “Stellar Atmosphere Modeling,” Tübingen, Germany, March, 2002.

### *Meetings Attended*

Chung Kao attended the 5th International UCLA Symposium on Sources and Detection of Dark Matter and Dark Energy in the Universe (Dark Matter 2002), February 20 - 22, 2002, Marina del Rey, California. He presented the paper “Indirect search for neutralino dark matter with high energy neutrinos.”

Lloyd Bumm, Sheena Murphy, Kieren Mullen, Matt Johnson, and Mike Santos attended the Oklahoma NSF EPSCOR Annual Conference: Functional Genomics Resources Consortium & Network for Nanostructured Materials, 16 May 2002.

John Cowan attended: 1) the Eleventh Workshop on Nuclear Astrophysics, Ringberg Castle at Lake Tegernsee, Germany (February 2002) and presented “The r-Process and Chronometers,” with co-authors C. Sneden and J. W. Truran; and 2) Low Z at Low z and High z: Early Chemical Evolution, Minneapolis, MN (March 2002) “The r-Process and Nucleochronology.”

Rollin Thomas attended the Workshop on Stellar Atmospheres in Tübingen, Germany, from April 8-12, where he presented a poster entitled “Synthetic spectra from 3D models of supernovae.”

Ed Baron attended a meeting on Stellar Atmosphere Modeling, Tübingen, Germany, Mar. 2002.

Ramin Abolfath attended the March APS meeting in Indianapolis and gave four talks: 1) “Anisotropic magneto resistance of (III, Mn) V Ferro magnets,” 2) “Global phase diagram of bilayer quantum Hall Ferro magnets,” 3) “Microscopic Theory of Critical Currents in Quantum Hall Super fluids,” and 4) “Theory of optical conductivity of (III, Mn) V ferromagnetic semiconductors.”

Mike Santos’ group attended the APS March Meeting in Indianapolis on March 18-22, and made three presentation: 1) Mike Santos presented a talk entitled “Spin- and cyclotron resonance in symmetric and asymmetric InSb quantum wells: resolving the Rashba spin Splitting,” by M. B. Santos, G. A. Khodaparast, R. E. Doezema, S. J. Chung, and K. J. Goldammer; 2) Niti Goel presented a talk entitled “Ballistic electron transport in InSb quantum wells,” by N. Goel, S. J. Chung, M. B. Santos, K. Suzuki, S. Miyashita, and Y. Hirayama; 3) Tetsuya Mishima presented a poster entitled “Structural and Electronic Properties of AlInSb/InSb Quantum Wells Grown on GaAs (001) Substrates,” by T.D. Mishima, J.C. Keay, N. Goel, M.A. Ball, S.J. Chung, M.B. Johnson, and M.B. Santos.

Ryan Doezema attended the March APS meeting in Indianapolis.

Karen Leighly and Darrin Casebeer attended the FUSE Science and Data Workshop, March 20-22, at JHU in Baltimore, MD. Darrin presented a poster entitled “FUSE Observations of Narrow-line Seyfert 1 Galaxy RE 1034+39,” D. Casebeer & K. M. Leighly

Karen Leighly attended the FUSE Observers Advisory Committee meeting on March 19, from which she reports that the major development has been the recovery of the satellite operations after the loss of two reaction wheels in late 2001.

Kim Milton attended the April, 2002, meeting of APS, Albuquerque, to explore the possibility of publishing another book (this time with Springer Verlag) on Schwinger's contribution to classical and quantum radiation theory. Hopefully, the project will be finalized by the end of the summer.

Dick Henry attended the conference Low Z at Low z and High z: Early Chemical Evolution, Minneapolis, MN (March 2002)

#### *Visitors at Nielsen*



Yun Wang hosted two visitors recently: Hume Feldman, from the University of Kansas, March, 2002, with whom she discussed the study of the large scale structure in the Universe; and Daniel Holz, from the Institute for Theoretical Physics, Univ. of California, Santa Barbara, in October, 2001. with whom she is collaborating on the study of weak gravitational lensing of supernova.

Jochen Sigmund, a graduate student from Darmstadt University in Germany visited Mike Santos's group for two weeks in April to learn about growth of InSb-based heterostructures by molecular beam epitaxy.

Yoshiro Hirayama, from NTT Basic Research Laboratories in Japan, visited from May 9 to 12 to discuss collaborations with the solid-state group. He gave a solid-state seminar entitled "Nanomechanical Systems and Nanoprobng of Electron-Wave Features Based on InAs Heterostructures".

Ed Baron hosted Sebastien Bongard from Lyon, France. Sebastien liked the department so much that he is getting a dual Ph.D degree from OU and Lyon.

Karen Leighly hosted Andrzej Zdziarski from N. Copernicus Astronomical Center, February 21 and 22. They worked on the Chandra observation of the Narrow-line Seyfert 1 galaxy 1H0707-495.



*Grants Awarded*

Eric Abraham and Neil Shafer-Ray were awarded \$488,000 from the DEPSCoR program through the Office of Naval Research for studies of Methods to cool and Trap Atoms and Molecules.

Kim Milton: US Department of Energy, Nonperturbative Quantum Field Theory, \$98,000 (April 1, 2002-March 31, 2003)

Ed Baron: NASA, LTSA supplement to Multi-Wavelength Modeling of Supernovae, \$20,000

Oct. 1, 2001-Sep 30, 2002





### *Research Travel*

Eric Abraham helped with the Office of Naval Research Program Review, April 28 - May 1, in Arlington, VA, on Development of Methods to Cool and Trap Atoms and Molecules.

Brad Abbott has been traveling to Fermilab every two weeks to attend meetings and discuss progress with colleagues. A number of conferences are approaching, including an international DO workshop at OU, July 8-12, and Brad has been busy organizing speakers and approving new results.

Ed Baron visited the University of Georgia in December where his long-term collaborator Peter Hauschildt has been for the last six years. Peter is moving to Hamburg, Germany, so future visits will be less frequent and require longer plane rides.

Dick Henry reviewed proposals in space physics in Washington for the National Research Council, March.



### *Summer Plans*

Lloyd Bumm plans to spend the summer setting up his lab.

Eric Abraham says, "We will have five new graduate students working on the cold molecule collaboration this summer. It is a very exciting time."

Rollin Thomas plans to travel to Leiden, the Netherlands, in July, for a workshop on supernovae, and then go to a short meeting in Munich on Type Ia's.

Brad Abbott's summer plans are to travel to Fermilab as much as possible in order to get results ready for summer conferences. Says Brad, "A large workshop for his experiment will be taking place at OU this July [see above] so it will be a busy summer."

Yun Wang plans to do research on cosmology, and supervise one REU student, in addition to one graduate student.

Kim Milton will work with Carl Bender for a week at Washington University on novel approaches to quantum field theory. Then he'll spend a week at the DPF meeting at William & Mary. At the end of June, he will attend the Sakharov Conference in Moscow, followed by a short visit to the General Relativity and Gravitation meeting in Tomsk, Siberia.

Mike Strauss is still spending about half his time at Fermilab doing research with the D0 collaboration. He will maintain this schedule, more or less, until fall.



### *Research Breakthroughs*

Eric Abraham reports that, "With the Shafer-Ray group, we recently demonstrated a new method of producing ultra cold samples of any Paramagnetic gas. Two of the last five Nobel prizes has gone towards experiments using ultra cold gases, but the methods rely nearly exclusively on alkali metals. The experiments conducted in our collaboration may open up these experiments to the rest of the periodic table, as well as molecules."

Dick Henry and Jason Prochaska (Carnegie Observatories) have discovered evidence, which suggests that star formation in the early universe was characterized by the formation of proportionately more massive stars than is the case in recent times.

## MULLEN TO CAMAROOON



OU has many students from Cameroon on campus, and a few of them in this department. Based upon this connection, Kieran Mullen was contacted by Prof. Jean-Marie Ndjaka, a professor at the University of Yaounde in Cameroon. They wrote a grant together to the International Programs office of the National Science Foundation, which was funded. Prof. Ndjaka visited OU for about three months. An experimental physicist by training, he was interested in moving towards doing theoretical research. Prof. Mullen in turn will visit Cameroon for two weeks this summer. Kieran is also the Chair of Graduate Recruiting. By establishing a connection between the two campuses he hopes to provide an opportunity for talented African students to come to study at OU. Located in equatorial West Africa, Cameroon is about the size of California. It has a population of 16 million. It has a history of French and English colonization, so both languages are spoken there.

Prof. Mullen will be making a similar trip to the Republic of Georgia next year, based upon a different grant program.

## TEACHING NEWS

From Eric Abraham: "The class coming into 1205 in the fall of 2001 was one of the largest we

have seen for some time with over 40 students. Hopefully, this is signaling a trend to more graduates of the program in the future." From Kim Milton: "I taught Quantum Field Theory over internet-based interactive video. I had seven students at OU, and four at OSU. The technology still leaves much to be desired, as it's hard to do better than using a large blackboard. Instead, I had a small board with markers (often dry), which the students in Stillwater had to read with a rather low-resolution camera. Distance learning still has a long way to go, or maybe that's the problem!"

Ed Baron says, "I really enjoyed teaching Stellar Atmospheres" [in the spring].

David Branch, Ed Baron, and John Cowan presented lectures on cosmology and the early universe in April as part of the Faculty In Residence program.

### **BITS FROM NIELSEN HALL NETWORK**



Our computer network has a bit more - and a bit less - than it formerly did. On the bit more side, we have grown to a total of 39 Sun workstations (with more on the way) including 10, which are available in the grad student offices in Room A201. Our total number of Unix systems currently stands at 55 including our losses mentioned next.

On the bit less side, we have bid farewell to our IBM SP2 system. The hardware was not supported by the versions of AIX, which IBM updates and so no new security fixes were available. The SP2 was hacked into because of this and it was deemed best to simply shut it down. The new OU supercomputer center (see <http://www.oscer.ou.edu/>) will be up and running soon to provide the support for our high-end computer users.

## **LARGE INTERACTIVE CLASSES**

This past semester, an intrepid group of physics and astronomy faculty members participated in an experiment to change the dynamics of large lecture classes. Wireless voting systems were installed in the two new large lecture halls in Nielsen. Students vote using small infrared remotes, their answers are recorded by a computer in the classroom, a histogram of their answers can be displayed immediately after the vote is done to stimulate class discussion, and the answers of each individual student is recorded for analysis and grading. The goals of the system are to make a large class experience more personal and engaging for the students, and to better match the content and pace of the class to what students do or do not understand. Similar voting systems have been used at other schools for a few years, but this was a new adventure for our department. Participating in the project were Karen Leighly (Astro 1504/1514), Stu Ryan (Phys1114) Lloyd Bumm (Phys 2414), Kieran Mullen (Phys 2424), Pat Skubic (Phys 2514), Bruce Mason (Phys 2524), and approximately 1,400 students. Despite technical problems with the system, the reviews of the participants were generally positive. In two classes where surveys were taken of students, 70 - 80% of the responses rated the system as either useful or very useful. All the instructors reported much better attendance in class and most were certain they would use the system again.

Special thanks go to Stu Ryan and Bill See for their efforts installing the system the week before classes started, and to the department and the College of Arts & Sciences for funding the purchase of the system.

Bruce Mason

## **MASON UPGRADE**

Since January 1, Bruce Mason has been the Director of the Physical Sciences Resource Center (PSRC) of the American Association of Physics

Teachers. The PSRC is an online collection, or “digital library,” of resources to help teachers of physics and astronomy. It contains materials and links to syllabi, assessments, demos, labs, online learning objects, and education research.

Bruce’s first four months on the (half-time) job were spent writing a grant to support the growth of the collection. The summer will be spent redesigning the site to make it more dynamic and user friendly. The PSRC is online at

<http://www.psrc-online.org>.

This position grew out of Bruce’s involvement with the MERLOT project (Multimedia Education Resource for Learning and Online Teaching), an international collaboration to create a multi-discipline, peer-reviewed digital library of online learning objects. Started in the mid-1990's by the California State University system, MERLOT has been operating in its current form for about three years. Bruce has been one of the lead editors on the physics editorial board since this time. MERLOT is online at <http://www.merlot.org>. Anyone interested in finding out more about MERLOT, please feel free to contact Bruce at: (mason@nhn.ou.edu). He would particularly like to talk to anyone with an interest in becoming a reviewer.