ΦHYAST ΦLYER

The Department of Physics & Astronomy

The University of Oklahoma

Volume 10, Number 2 Winter, 2002 Dick Henry, Editor

Website: http://www.nhn.ou.edu

REFLECTIONS ON 2001

The Department continued its forward progress in 2001. Our credit hour "production" for the 2000/01 academic year increased by 9% over the previous year to 13,947 and the current academic year even promises at least as large an increase over last year. Our external research dollars for FY2001 stood at $2.3M, an increase of 10% over FY2000. The Faculty's work was recognized by OU with a fine number of awards for both teaching and research.

With the additions of Lloyd Bumm (Solid State and Applied Physics) and Jim Shaffer (Atomic, Molecular, and Chemical Physics), we increased to a record high of 29 permanent Physics and Astronomy faculty. And in spite of the fact that each of us ages by one year annually, our median age has dropped to 43. Thanks to our many "new faculty" we are a younger department than we have been for many years and also very young by national comparisons. This means that, even though we are doing very well; "you ain't seen nothin yet!"

A year ago I wrote that our wish list for 2001 included a large entering class of graduate students and the beginning of Phase II of the Nielsen Hall Addition and Renovation Project. The size of our entering class this fall was indeed an improvement over the previous year, but effective and successful graduate recruiting remains the highest priority within the Department. The second item on the wish list has become reality! A second new addition will be built on the southeast side of Nielsen Hall starting early this summer. When completed sometime late in 2003, it will contain all the faculty offices thereby freeing up space in old Nielsen Hall for research. It comes just in the nick of time: old Nielsen Hall is bursting at the seams. We are grateful to our Vice President for Research, Lee Williams, and to President Boren for creating a way to make this all possible.

We received wonderful support from our alumni in 2001. Many of you donated to departmental endowments and there are two of you who made us beneficiaries in your wills. At the end of the year we learned of an especially large gift which we will feature in a future article. Your trust in us, in the job we are doing, and in our future is gratifying and humbling. Thank you so much! We pledge to keep up the good work!

DEPARTMENT TO HOST DO WORKSHOP

The OU High Energy physics group will be hosting the D0 Collaboration Workshop on July 8-12, 2002. This is an annual workshop with about

300 physicists from the collaboration. The workshop will be held on the OU campus, primarily in Nielsen Hall. We will be discussing the current and future physics prospects for D0, as well as the status of the detector and the accumulated data. I'm doing a lot of work organizing this workshop. It is a great opportunity to show the D0 collaboration, and the HEP community, the exciting things going on in the department and in the university.

Mike Strauss

ALUMNI NEWS

Paul L. McEuen (B.S. Engr. Phys. 1985), a Professor of Physics at Cornell

University, was awarded the 2001 Agilent Technologies Europhysics Prize by

the European Physical Society. He and his co-awardees (Sumio Iijima, Cees Dekker, and Thomas W. Ebbese) were cited for the discovery of multi and

single walled carbon nanotubes and pioneering studies of their fundamental mechanical and electronic properties.

In 1991 Dr. Iijima discovered a new form of carbon, called carbon nanotubes. These are cylindrical molecules with a diameter that can be as small as a nanometer and with a length up to many microns.

In addition to resilient mechanical properties, nanotubes have remarkable

electrical properties. In 1997 Dr. McEuen's group at UC Berkeley showed that nanotubes behave as coherent quantum wires. In 2000, they showed that inter-nanotube junctions display rectifying behavior and hence act as

molecular diodes. This experiment demonstrated in a striking way the potential for applications in nanoelectronics.

The Agilent Technologies Europhysics Prize was created in 1975 in recognition of recent work in condensed matter physics, specifically work

leading to advances in the fields of electronic, electrical and materials engineering. Dr. McEuen and his co-awardees have made essential contributions to open a new field in condensed matter physics at the interface of nanoscience, nanotechnology and molecular electronics.

***

From Kent Smith (B.A. Astro.): "First and foremost, my wife Kari and I just welcomed our first child. Kathryn Calista Smith was born October 10, 2001. All of us are home doing well. Seems to me like that day was destined, 10/10 makes her `double perfect.' Of course that could just be a proud father talking. That little girl already has me wrapped so tightly around her finger that I can barely breathe. (LOTS of photos of her and the

rest of us on my web album: http://photos.yahoo.com/jkents.

(Most of the new baby photos are still in the "baby arrival" file.) A distant second in the news category: Effective September, 2001, I was promoted to Associate Professor and Program Chair of the General Education Science department at Texas State Technical College West

Texas at Sweetwater. General Education Science includes *all*

mathematics and science for the college. Needless to say, those two announcements have had me *very* busy the last few months and it doesn't look like the workload at home or the

college will be letting up anytime in the next couple of decades or so- and I am loving every minute of it!"

Kent Smith

kent.smith@sweetwater.tstc.edu

***

From Bish Ishibashi (B.A. Astro.):

"I thought I'd drop you a line to tell you that I'm doing fine as a research scientist (no, not postdoc anymore) at Center for Space Research, MIT. I'm working on Chandra grating instruments and will be doing that (if everything goes well) for a few years. Life is good here.

"Bish" K. Ishibashi, Ph.D.

Massachusetts Institute of Technology

Center for Space Research bish@space.mit.edu

***

Dr. Jack S. Goldstein, professor of astrophysics, Brandeis University, died recently in Boston. Jack received his M.S. degree in physics at OU in 1953. He joined Brandeis as a visiting professor in 1956 and became a full professor there in 1966. While at Brandeis he also served as dean of the graduate school and dean of faculty before retiring in 1992.

NEAL LANE RECEIVES A&S HONOR

Neal Lane was one of four people to receive the College of Arts and Sciences Distinguished Alumni Award during ceremonies on Friday, March 1. Neal received his undergraduate degree in Physics at OU. He has been the Edward A. and Hermena Hancock Kelly University Professor and Senior Fellow, James A. Baker III Institute for Public Policy, Rice University; former Assistant to the President for Science and Technology; Director, White House Office of Science and Technology Policy; and Director of the National Science Foundation. As part of the day's events, Neal presented a lecture entitled "Science, Policy, and Politics: The Three Body Problem."

RESEARCH NEWS

Recent Publications

"Ratio of Isolated Photon Cross Sections in p-barp Collisions

at Center of Mass Energies of 630 and 1800 GeV,"

D0 Collaboration, V.M. Abazov, B. Abbott,...P. Gutierrez,...M.Strauss,...et.al., Phys. Rev. Lett. 87, 251805 (2001).

"Search for New Physics Using Quaero: A General Interface to D0 Data," D0 Collaboration, V.M. Abazov, B. Abbott,...P. Gutierrez,...M.Strauss,...et.al., Phys. Rev. Lett. 87, 231801 (2001).

"Search for First-Generation Scalar and Vector Leptoquarks,"D0 Collaboration, V.M. Abazov, B. Abbott,...P. Gutierrez,...

M.Strauss,...et.al., Phys. Rev. D64, 092004 (2001).

"Measurement of the Ratio of Differential Cross Sections for W and Z Boson Production as a Function of Transverse Momentum," D0 Collaboration, V.M. Abazov, B. Abbott,...P. Gutierrez,...M.Strauss,...et.al., Phys. Lett. B517, 299 (2001).

"Search For Single Top Production at DO Using Neural Networks," D0 Collaboration, V.M. Abazov, B. Abbott,...P. Gutierrez,...M.Strauss,...et.al., Phys. Lett. B517, 282 (2001).

"A Complete Analytic Inversion of Supernova Lines in the Sobolev Approximation", D. Kasen, D. Branch, E. Baron, and D. J. Jeffery, ApJ,

565, 380 (2002)

"Comment on `Casimir Energy for Spherical Boundaries,'" I. Brevik, B. Jensen, and K. A. Milton, Phys. Rev. D 64, 088701 (2001)

"Relativistic Coulomb Resummation in QCD," K. A. Milton and I. L. Solovtsov,

Mod. Phys. Lett. A 16, 2213 (2001)

"Constraints on Extra

Dimensions from Cosmological and Terrestrial Measurements," K. A. Milton, R. Kantowski, C. Kao, and Yun Wang, Mod. Phys. Lett. A 16, 2281 (2001)

"Dimensional and Dynamical Aspects of the Casimir Effect: Understanding the Reality and Significance of Zero-Point Energy," K. A. Milton, in Quantization, Gauge Theory, and Strings, ed. A. Semikhatov, M. Vasiliev, and V. Zaikin, Scientific World, Moscow, 2001, vol. II, p. 333 (Invited talk at Fradkin Memorial Conference)

'The Casimir Effect: Physical Manifestations of Zero-point

Energy," K. A. Milton, (World Scientific, Singapore, 2001), a 300-page research monograph.

"The Continuing Radio Evolution of SN 1970G," C. J. Stockdale, W. M. Goss, J. J. Cowan, and R. A. Sramek, Astrophys. J. Letters, 559, L139 (2001)

"S, Cl, & Ar Abundances in Planetary Nebulae. I.: Observations and Abundances in a Northern Sample," K.B. Kwitter, R.B.C. Henry, & R. Cohen, Astrophys. J., 562, 804 (2001)

"S, Cl, & Ar Abundances in Planetary Nebulae. IIA.: Observations in a Southern Sample," J.B. Milingo, K.B. Kwitter, R.B.C. Henry, Astrophys. J. Supp., 138, 279 (2002)

"S, Cl, & Ar Abundances in Planetary Nebulae. IIB.: Abundances in a Southern Sample," J.B. Milingo, R.B.C. Henry, K.B. Kwitter, Astrophys. J. Suppl., 138, 285 (2002)

Conferences/Workshops Attended

In January, David Branch spoke on 'Type Ia Supernovae as Distance Indicators for Cosmology " at the Washington AAS meeting.

Kim Milton attended the 5th Workshop on Quantum Field Theory Under the Influence of External Conditions, Leipzig, Germany, September 2001, and gave the invited opening talk on "Theoretical and Experimental Status of Magnetic Monopoles," (with G. R. Kalbfleisch, W. Luo, and L. Gamberg), to be published in

Int. J. Mod. Phys.

***

The following papers were presented as posters at the January meeting of the American Astronomical Society meeting, in Washington, D.C.:

"Radio Counterparts to X-ray Sources in M83," C. Stockdale, J. J. Cowan, L. A. Maddox, C. K. Lacey, M. P. Rupen, A. H. Prestwich, R. Kilgard, M. I. Krauss and A. Zezas .

"The Abundances and Age of the Galactic Halo Star BD+17 3248," J. J. Cowan, C. Sneden, I. I. Ivans, S. Burles, T. C. Beers, J. W. Truran, J. E. Lawler, F. Primas, G. M. Fuller, B. Pfeiffer and K.-L. Kratz.

"HST-STIS Spectra of the r-Process-Rich Halo Giant CS 22892-052," C. Sneden, J. J. Cowan, J. W. Truran, T. C. Beers, J. E. Lawler.

"S, Cl, and Ar Abundances in a Southern Sample of Planetary Nebulae,"J.B. Milingo, R.B.C. Henry, and K.B. Kwitter.

Finally, Rollin Thomas, Darrin Casebeer, and Dean Richardson presented a poster on their new supernova spectrum database (SUSPECT).

***

Varuni Seneviratne attended the 57th Southwest Regional meeting of the American

Chemical Society held in San Antonio, Texas, from October 17th to 19th, 2001. She presented the talk "Structure characterization of diglyme:LiSbF6 crystal and

a comparison to P(EO)6LiSbF6 crystal," by Varuni Seneviratne, John Furneaux, and Roger Frech. Varuni was awarded $250 in travel support from the Graduate college to attend the meeting.

Karen Leighly attended the Workshop on X-ray Spectroscopy of Active Galactic Nuclei with Chandra

and XMM-Newton, December 3-6, MPE Garching, Germany. She presented an oral contributed paper entitled "A Chandra Observation of

the NLS1 Galaxy 1H 0707-495." Chiho Matsumoto attended the same meeting and presented an oral contributed paper entitled "Chandra HETG Observation of the NLS1 Galaxy Ark 564."

Chung Kao attended Snowmass

presented at Snowmass 2001,

Snowmass, Colorado, June 30-July 21, 2001, and gave two talks, "Implications of new CMB data for neutralino dark matter," and "Indirect search for neutralino dark matter

with high energy neutrinos."

Colloquia, Papers Presented

Mike Santos presented a talk on "Novel Electronic Properties of InSb Quantum Wells" at the University of Arkansas on January 25.

In November, David Branch gave a colloquium on "Thermonuclear

Supernovae as Probes of the Universe," at UT Dallas.

Kim Milton gave a colloquium at the University of Kansas, "Julian Schwinger: From the Radiation Laboratory to Renormalized QED," December 10, 2001. He also presented a seminar at SUNY Stony Brook, "Theoretical and Experimental Status of Magnetic

Monopoles," October 29, 2001

Karen Leighly presented the bedlam colloquium entitled "Narrow-line Seyfert 1 Galaxies - a key for Understanding Active Galactic Nuclei," OSU

Physics Dept., October 18.

Chung Kao presented the colloquium "The Higgs Challenge'," November, 2001, Oklahoma State University; September, 2001, University of Texas at Dallas; March, 2001, National Taiwan Normal University; and March, 2001, Tamkang University. He also presented a seminar titled "Indirect Search for Neutralino Dark Matter with High Energy Neutrinos," April, 2001, The KEK in Japan; April, 2001, The Southern Methodist University; April, 2001, The University of Texas at Austin.

Visitors at Nielsen

Kim Milton hosted two visitors recently: Sergei Odintsov, Tomsk State Pedagogical University, October, quantum

Gravity; and Umar Mohideen, University of California at Riverside, November, Casimir

effect measurements.

Andrzej Zdziarski from N. Copernicus Astronomical Center visited Karen Leighly

December 10-13. Karen reports, "We tried to fit the enigmatic X-ray spectrum from the Narrow-line Seyfert 1 galaxy 1H0707-495, but have not yet succeeded."

Grants Awarded

Research/Creative Activity Equipment/Facilities

Grant: Strauss, Skubic, Gutierrez, and Abbott, "Semiconductor Detector

Design and Testing Facility:" $18,350.00, OU

Chandra Guest Investigator Cycle 3, K. M. Leighly, J. P. Halpern, E. Jenkins, D. H. Helfand, & R. Becker, "Exploratory Observations of a New Bright Quasar," $25,490

HST Archival Researcher/Theory grant for Cycle 11, Rollin Thomas, "Supernova Spectrum Synthesis for 3D Composition Models with the Monte Carlo Method," $50,000.

"Does the S+Ar Abundance Track the Fe Abundance in the Interstellar Medium?", Karen Kwitter (Williams), Dick Henry, and Y-H. Chu (U. IL), 4 meter telescope time, Kitt Peak National Observatory.

Research Travel

Niti Goel (one month) and Mike Santos (one week) visited

NTT Basic Research Laboratories in Japan to continue an ongoing

collaboration on ballistic electron transport in InSb quantum-well samples.

Mike Strauss reports:

"I'm still spending about half my time at Fermilab doing research. Last semester I was on sabbatical, and this semester I am not teaching. Being at Fermilab provides a great opportunity to interact with the rest of the collaboration and make contributions to the experiment that can't be done as effectively at OU. It is exciting to have the opportunity to spend this much time at

Fermilab for over a year."

In September, David Branch visited the Lawrence Berkeley Lab to work on the interpretation of LBL data on the hypernova SN 1999as, one of the most luminous stellar explosions ever seen. (Fortunately it was very far away.)

WANG TO GIVE PUBLIC LECTURE ON COSMOLOGY

Prof. Yun Wang will present a public lecture on "Understanding the Universe - Cosmology in 2002," at 8p.m., Friday, April 19, in A204 Nielsen Hall. Yun, one of our newest astronomers, joined the Department in the fall, 2000. Her research interests include the study of anisotropies in the cosmic microwave background. Following the lecture, the OU Observatory will be open for public viewing, weather permitting.

TEACHING NEWS

Kim Milton gave six talks in the fall to church and civic groups, on "Science vs. Religion: The Case for Evolution," as part of

the University's Speakers Service. Kim also spoke on the same topic at the November Friday Night at the Observatory public event.

MORE ON BOHR

I'm often overcome with guilt about this matter of when Niels Bohr actually lectured at OU and are transcriptions of his lectures available. The issue has been in play now for over a year, and I have yet to walk over to the library and speak with someone about an archived transcription. But you know, you guys are having so much fun with this, I hate to shut it down that way, so I think I'll just continue it as an "exercise for the reader."

Here's the latest piece of input, this time from Tom Miller, former faculty member in the Department. "I typed my question [about Bohr]

into google.com and found the following, where they say they have both a recording and a transcript of the 1957 OU lecture: http://www.nbi.dk/NBA/icos/tapes.html Here's what that website says: `Many of Bohr's lectures, as well as informal interviews (including the

one conducted as part of SHQP) on tape and, in one case, on a record (78rpm). Transcriptions of some of the lectures exist; those not already included in other collections form part of this collection. (T) indicates that a transcription exists.

`Recordings of Bohr's lectures include: Gifford Lectures, Edinburgh (1949)

(T); Biology seminar, USA (1957); Oklahoma lecture (1957) (T); Macalaster College (1957); Compton Lectures, MIT (1957) (T); Carlson lecture, Iowa (1957) (T); Rutherford Memorial Lecture, London (1958) (T); Culture Congress, Copenhagen(1960); Genetics Institute, Cologne (1962) (T).'"

And did you know that you can now catch Niels and protege Werner Heisenberg on stage these days? *Copenhagen*, the play by Michael Frayn, centers on a meeting between the two physicists in 1941, the details of which are sketchy. The two-act dialogue between the two scientists and Bohr's wife Margarethe, deals with moral issues concerning the development of nuclear weapons, Heisenberg's link with the Nazi regime, Bohr's link with the American efforts to develop a nuclear weapon, and the true purpose of Heisenberg's visit to Copenhagen.

Dick Henry

PERFECT SYMMETRY

As the clock ticks over from 8:01pm on Wednesday, February 20th, 2002, time (for sixty seconds only) read in perfect symmetry. To be more precise: 20:02, 20/02, 2002. It is an event which has only happened once before, and is something which will never be repeated. The last occasion that time read in such a symmetrical pattern was long before the days of the digital watch or the 24-hour clock: 10:01AM, on January 10, 1001. And because the clock only goes up to 23.59, it is something that will never happen again.

And you probably missed it this time!