"All the ν's
That's fit to Print"

ΦYAST ΦLYER

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REFLECTIONS ON 1994

Another year of progress for the Department has passed. Just accomplishing our duties of teaching, research, and service is progress enough, but there are several items which mark the year as a very good one.

Foremost among the good things which have happened are the new people who have joined the Department. Kieran Mullen, our newest condensed matter theorist, arrived in August from a post-doc position at Indiana U. Also hired during 1994 as brand new assistant professors (and who arrived in early January 1995) were our newlyweds, Sheena Murphy and Matthew Johnson. Sheena, a condensed matter experimentalist, came to us from a post-doc position at AT&T Bell Labs while Matthew, also a condensed matter experimentalist, came from a post-doc position at IBM, Zurich. Matthew's degree is actually in applied physics, so that after years of asking ourselves what constitues applied physics, we can now just observe! We also are fortunate to have new post-docs Anna Golitsyna (solid state), Bijan Nemati (high energy), Gamini Dharmasena (atomic and molecular), and Wayne Trail (atomic and molecular). A great new class of 10 graduate students joined us in the fall. Danette Miller joined our office staff early in 1994 and quickly became a vital part of keeping the Department operating smoothly.

The Department's vital signs are all very positive. Our fiscal year 1994 external funding reached an all-time high of $1.8M, we published a record number of papers, and had our teaching program recognized through the auspices of Stu Ryan, who garnered yet another award, the University's new General Education Award. Our superb office staff, supervised for over 10 years now by Linda Christie, also has a 1994 award winner, Grettie Bondy, who received the University's Distinguished Service Award.

In December of 1994, the Department received a $5,000 gift (anonymously, at least for the time being) to begin a fund to endow a "Lin Graduate Research Fellowship" in honor of Professor Chun C. Lin, who was at OU for thirteen years during the 60's and late 50's and who is now John and Abigail Van Vleck Professor of Physics at the University of Wisconsin, Madison. We will begin a drive early this year to complete the endowment by contacting our alumni, beginning with the many doctoral and masters students whose research was supervised by Professor Lin when he was here.

During 1995 we expect to see the start of building the first phase of the Nielsen Hall addition and renovation project. This phase features the construction of an annex to our building containing two large lecture halls. The OU Regents have allocated bond funds to this first phase.

So, it looks like another good year ahead, doesn't it?

Ryan Doezema

WELCOME MATT JOHNSON

The department is pleased to announce the arrival of Matt Johnson as an Assistant Professor in the Solid State/Applied Physics research group. Matt comes to us via postdoctoral positions at IBM Research Laboratories in Zurich, Switzerland and Yorktown Heights, New York where he studied semiconductor heterostructures using various forms of scanning tunneling microscopy (STM). His investigations of cross sections of semiconductor multilayers have produced direct images of atomic ordering in GaInP alloys, the sharpness of GaAs/AlGaAs interfaces, and the dopant distribution in delta-doped layers in GaAs. By using STM in combination with STM-induced luminescence, he also obtained atomic resolution of quantum wires made from GaAs-based heterostructures. Matt will continue his STM research at OU, where the availability of InSb-based heterostructures from our MBE lab will hopefully lead to new results.

Matt received a Ph.D. in Applied Physics from Caltech in 1989 and a B.Sc. in Physics from the University of Waterloo in Canada. He is married to Sheena Murphy, the department's other new faculty member.

Mike Santos

WELCOME SHEENA MURPHY

Near the end of our search for new faculty to join the Department and the Solid State Group, we discovered that our top candidate, Matthew Johnson, was one half of a two-body problem; i.e. his spouse, Sheena Murphy, is also a Solid State Physicist in need of a job. At first we on the search committee thought this would make it impossible to even make an offer to Matt. However, through the enlightened support of the rest of the Department and the University through the spousal hiring policy, we found that we could make a competitive offer to Sheena also. This serendipitous occurrence has allowed us to add an additional superb Solid State experimentalist to our group. Since her arrival at the beginning of January, we have all been impressed with her drive and ability to seamlessly fit into the Solid State Group and Department creating a more dynamic and capable whole.

Sheena grew up in the diverse environments of rural Ireland and the Bronx in New York City. She then got her undergraduate degree at the Massachusetts Institute of Technology in Physics. She worked with Prof. Thomas Greytak developing a capacitive detector of superfluid 4He third sound. She then went on to Cornell University for graduate studies in Low-Temperature Physics with Prof. John Reppy as her thesis advisor. Her thesis work involved careful measurements of superfluid 4He interacting with porous substrates. She was able to show conclusively that superfluid 4He behaves 3-dimensionally even in sub-monolayer films. She was also able to provide critical tests of renormalization group theory of phase transitions with measurements of very robust new critical exponents in 4He confined within very porous (94-99%) glasses. After graduation Sheena became a Post-doctoral research associate with Dr. Alan Fowler at the IBM T. J. Watson Research Center in Yorktown Heights, NY. Here she worked on far-infrared spectroscopy of SiGe samples. Then in 1992 she went to AT&T Bell Laboratories Murray Hills, NJ, for a second post-doc

with Dr. James Eisenstein. At Bell Labs she studied 2D electron systems of the highest quality in GaAs/AlGaAs heterostructures. She was particularly instrumental in elucidating the behavior of coupled double-well systems, and recognized a new type of phase transition in them. This work has resulted in considerable recognition: an invited talk at the 1994 March meeting in Pittsburgh, and an invitation to participate in the Aspen Winter School this January.

Sheena will fit into the Department and group very well. As a Low-Temperature Physicist, she can fill the gap left by Steve Whitmore; as a Semiconductor Physicist with experience in 2D systems, far-infrared spectroscopy and the fractional quantum Hall effect, she augments our experimental efforts; as an expert on superfluids, she provides an experimental perspective to Kieran Mullens theoretical work; as an experienced practitioner of renormalization group methods and critical behavior, she brings a fresh and welcome perspective to our exciting work in Si MOSFETs; and as a concerned and active teacher, she will continue to enhance the Departments reputation for superb quality education. Furthermore, we feel that with a Murphy in residence we may have an added edge in battling the Murphy of Murphy's Law.

John Furneaux

ALUMNI NEWS

We would like to thank our readers for returning the survey cards sent to you in the last newsletter. Of the 900 or so cards sent out, roughly one-third were returned, which according to survey experts is a superb return. Nearly a third of those respondents requested that they receive the Department brochure, and that will be mailed to you soon if you requested it. We are glad to be able to get the word out on our Department and really appreciate your response.

Joseph Cecrle (BS91 EP) is currently employed at Tinker AFB in their Environmental Management Office, Restoration Division. This is the same office in which Kevin Van de Velde (BS88-89 PHYS) worked for a while. There was another graduate, Hilary Steward Raleigh (BS86 PHYS), who was working in this office until last year, when she moved to Eglin AFB in Florida. Joseph is currently working on his Masters in Environmental Engineering (emphasis in groundwater) at OU, and hopes to finish as early as December, 1995 if things go well. Joseph is married and currently living in Moore. His email address is: jcecrle@po25.tinker.af.mil.

COMPUTER LAB TURNS ONE-AND-A-HALF

The computer lab in Nielsen Hall, also known as the Natural Sciences Computer Lab, has been open since the Fall of 1993, and steadily grows in use and popularity. Funded by the College of Arts and Sciences, the Provost's Office, and our Department, the lab is open for individual use and, by reservation, for use by natural science departments for computer curriculum. We have been able to put together a computer facility that is unique to the College with a wide range of numerical, graphical, and word processing software. There is access to the Internet ("Information Superhighway" for those who like buzz words), scanners, printers, and multimedia. Until recently, Physics and Astronomy and Zoology were the biggest departmental users of the lab, but this semester Math and Botany-Microbiology will make use of the facilities. So far we have been able to avoid most of the big catastrophes that can overtake computers, making the lab a success.

Several members of the department have braved the obstacles involved in incorporating computers in their classes. By far the largest numbers of students who have been put through the lab have been from the Astronomy 1504 classes. They have used the computers as simulated observatories, particularly for solar system astronomy. Maureen O'Halloran has started out our freshmen with experience in MathCAD, a general purpose algebra and calculus program that should prove useful for a great deal of their future work in the department. Other efforts of note are Michael Morrison teaching a class Mathematica to do difficult problems in quantum mechanics, Fortran problems assigned by Mark Keil and Deborah Watson, and Ron Kantowski's use of a graphics program in waves class. The next advancement that needs to be made is to organize these efforts so that everyone with interest in using the lab can benefit from the efforts (and mistakes) of these pioneers.

Anyone with interest in the lab, or questions, should drop by Room 122 anytime from 9:00 am to 10:00 PM on weekdays, or contact me. The students who work the lab and I am always happy to show off what the lab can do for people.

Bruce Mason

NEWS FROM THE FRONT (office)

After 29 years, on and off, of taking courses and working hard, Grettie Bondy completed her BA in English this past December (c'mon, she can't be that old!). Such an acheevmint kwalfys her to be asistint idtor of the nuzlitter...to bad the curnt idtor dont need no hip. Any thoughts of going for a PhD in Physics, Grettie? It's right outside your door...and such great professors!

And then there's Linda Christie. After 10 long years of dedicated service and leadership in the office, Linda has been promoted to a new position of Assistant to the Chairperson. All who have worked with Linda certainly appreciate her efficiency, courtesy, and 100 Gbyte memory.

LEAVE ME ALONE!

Hidden away doing research in various corners of the world are Kim Milton, Greg Parker, and David Branch. Greg has been on sabbatical leave at the University of Houston since last summer, while Kim and David are on leave for the spring semester. Kim is working at Imperial College, London. David is keeping Norman as his home base but has visits of several weeks each coming up at the Space Telescope Science Institute in Baltimore and the Astronomy Department at Berkeley. May you each grow your minds.

THE PAPER CHASE:

Recent Publications

"Calculations of the spin dependence of transport and optical properties in wide parabolic quantum wells", C.E. Hembree, B.A. Mason, J.T. Kwiatkowski, J.E. Furneaux, and J.A. Slinkman, Phys. Rev. B 50, 15197 (1994)

"Phase diagram of the half-integer quantum Hall effect", Gautam Dev, X.C. Xie, and B.A. Mason, to be published Phys. Rev. B

"Design calculations for lead salt semiconductor quantum-well lasers", M.F. Khodr, B.A. Mason, and P.J. McCann, to be published, Jour. Appl. Phys.

"Radio Observations of M83 and Its SNRs", Cowan, J. J., Roberts, D. A., and Branch, D., ApJ 434, 128, 1994.

"The Absolute Magnitude Distributions of Type Ia Supernovae", Vaughan, T. E., Branch, D., Miller, D. L., and Perlmutter, S., 439, 558, 1995.

"Detection of a Nuclear Radio source in NGC 7331: a Relatively "Radio Quiet" Liner, Cowan, J. J., Romanishin, W., and Branch, D., ApJ 436, L139, 1994.

"Surface reconstructions of InSb(001) during molecular beam epitaxy", W.K. Liu and M.B. Santos, Surface Science 319, 172-183 (1994) [Note: This paper reports on the first results from the Department's new MBE machine!]

"Atomic structure and luminescence excitation of GaAs/AlGaAs quantum wires with STM", M. Pfister, M.B. Johnson, S.F. Alvarado, H.W.M. Salemink, ... Appl. Phys. Lett. 65, 1168 (1994).

"Semiconductor characterization with the scanning surface harmonic microscope", J.-P. Bourgoin, M.B. Johnson and B.Michel, Appl. Phys. Lett. 65, 2045 (1994).

"Cross-sectional STM of III-V Quantum Structures", M.B. Johnson, M. Pfister, S.F. Alvarado, and H.W.M. Salemink Mat. Res. Soc. Symp. Proc. Vol. 332, 599 (1994).

"Integer Quantum Hall Effect in Bilayer Systems:Evidence for New Phase Transitions", S.Q. Murphy, J.P. Eisenstein, G.S. Boebinger, L.N. Pfeiffer and K.W. West, Phys. Rev. Lett. 72, 728 (1994).

"The Form of Abundance Patterns in Three Nearby Spiral Galaxies: M33, M81, and M101", R.B.C. Henry, J.W. Howard, ApJ, 438,170, 1995.

"Discrete Time Quantum Mechanics", C. M. Bender, L.R. Mead, and K.A. Milton, Computers Math. Applic. 28, 279 (1994)

"Scalar Casimir Effect for a D-Dimensional Sphere", C.M. Bender and K.A. Milton, Phys. Rev. D 50, 6547 (1994)

RESEARCH TRAVEL

David Branch visited Allan Sandage at the Observatories of the Carnegie Institution of Washington, Pasadena, for two days in October. Presumably, the subjects of Ho, qo, and lambda came up.

Kim Milton made research trips to the University of North Carolina in October and to Washington University in November.

LAB & DOME

Jeff Winesett, a physics senior, has been funded ($500) by the OU Undergraduate Research Opportunities Program to study "Electrical Properties of InSb at Low Temperature". Mike Santos is his faculty sponsor.

During December of 94, John Cowan and his collaborators made three sets of observations using HST. The observations, in collaboration with Chris Sneden at Texas and Jim Truran at Chicago, were of the metal-poor giant HD 122563. The data are now being reduced. John, along with Sneden and McWilliam and Preston at Carnegie, also had 4 nights of observations using the 4meter telescope at CTIO (Chile) to search for very heavy elements in the ultrametal-poor galactic halo star CS 22892-052. The data are now being reduced.

Dick Henry spent three oxygen-starved nights atop Mauna Kea in October using the Canada-France-Hawaii 3.6m telescope to observe two galaxies in the cluster Abell 262. His collaborator is Chantal Balkowski of Observatoire de Paris. Dick and Chantal are studying abundance patterns in cluster spirals. The data are reduced and were being analyzed at press time.

David Branch and nine other members of the "Supernova INtensive Survey" (SINS, get it?), received 40 orbits of HST time for Cycle 5. In addition, his group of six studying "A Direct Measurement of Galaxy distances", received 6 orbits of HST time for Cycle 5.

Dick Henry, along with collaborators Mike Edmunds (Cardiff) and Bernard Pagel (NORDITA), have been awarded observing time on the to-be-launched ISO (Infrared Space Observatory) satellite to study chemical abundances in extragalactic H II regions.

MEETINGS ATTENDED

Matt Johnson attended the APS March Meeting, Pittsburg PA (March 94), and the Int`l Conf. Micro- and Nano-Engineering 94, Davos, Switzerland, Sept. 26-29, 1994.

Sheena Murphy attended the APS March Meeting, Pittsburg PA (March 94) Semimag '94, Semiconductors in High Magnetic Fields, MIT MA (May 94) and the Aspen Winter Physics Meeting: Physics in Reduced Dimensional Systems Aspen, CO (January 95).

David Branch attended the January meeting of the American Astronomical Society in Tucson.

John Cowan attended the First VLA Upgrade Workshop in Socorro, NM during the second week of January. He was invited to attend by NRAO, which was looking for scientific projects that currently could not be attempeted with the VLA. The intent is to upgrade the VLA in every way: new antennas, new railroad tracks, computers, software, etc. The timescale is a decade, and a document will come out sometime this year outlining the scientific justification for this project.

MEETING CONTRIBUTIONS

APS March Meeting

M.B. Johnson, N.I. Buchan, P. Roentgen, and H.M.W. Salemink "STM of ordered GaInP".

M. Pfister, M.B. Johnson, S.F. Alvarado, H.W.M. Salemink "STM and STL of GaAs/AlGaAs Quantum Wires".

Int`l Conf. Micro- and Nano-Engineering 94, Davos, Switzerland, Sept. 26-29, 1994

M.B. Johnson, J.-P. Bourgoin, and B. Michel "Doping Profiling with Scanning Surface Harmonic Microscopy". M. Pfister, M.B. Johnson, ... "Atomic-scale analysis of Quantum wire nanostructures with STM".

SEMINARS

Matthew Johnson:

Eindhoven University of Technology/ Physics Colloquia (May 94)

Max Planck Inst. (Stuttgart)/ Physics Colloquia (Jun 94)

Sheena Murphy:

Invited Talk APS March Meeting (same title as paper above)

Invited Talk Aspen Winter Physics Meeting

Princeton University Physics/EE Colloquia (January 94)

Yale University Physics Colloquia (May 94)

David Branch:

"Exploding Stars as Probes of the Universe", at the Okie-Tex Star Party at Lake Murray, October.

"Type Ia Supernova Mass Ejection - Chandrasekhar or Sub?" at a meeting on Supernova Explosion Mechanisms at the Steward Observatory of the University of Arizona.

Kim Milton

Seminar given on "The Casimir Effect: From Quarks to the Cosmos",

CASH FLOW

David Branch:

$30,000 from Harvard for "The Supernova INtensive Study: Phase IV" Space Telescope project.

Matthew Johnson:

Equipment donation from IBM (Yorktown), approximately $50,000; from IBM (Zurich), approximately $15,000, and from AT&T approximately $15,000.

Sheena Murphy:

Equipment donation from IBM totaling approximately $75,000.

Kim Milton

Received a small grant from the College of Arts and Science to help fund sabbatical travel.