"All the ν's That's fit to Print"

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Dick Henry, Editor

FROM THE CHAIR: REFLECTIONS ON 1993

Whew! What a year! Although it seems just yesterday that 1993 began, one is quickly convinced otherwise when summarizing what has occurred since January last year.

The coming and going of people into and out of the Department is always the most significant marker of the passing of time. First the good: who has arrived? Well, there are assistant professor Mike Santos, post-docs Goutam Dev, Pankaj Jain, Serguei Kravtchenko, and Amy Liu, office staff member Ruth Huang, and technical staff member Yousong Zhang. We also welcomed a fine group of 14 new graduate students into the Department and judging from our freshman majors' course, we have about 20 fledgling undergraduate physicists and astronomers. Then the bad: the retirements of Helmut Fischbeck and Steve Whitmore are still not quite believable and the place just is not the same without them. We also said good-bye to secretary Connie Walters, who moved to Utah with her family.

Our faculty continues to excel in teaching and research. This was recognized in 1993 with the awarding of a David Ross Boyd Professorship to Mike Morrison and a Regents' Award for Superior Teaching to Dick Henry. These bring the number of University and state awards to our faculty in recent years to 20, a remarkable record! Another marker of excellence is that the Department's external funding in fiscal year 1993 reached an all-time high of $1.77M up from the previous year's record of $1.34M.

The Department acquired two magnificent facilities in 1993. A fine Arts and Sciences computer lab is now located on the first floor of Nielsen Hall. The hard work of Greg Parker and Bruce Mason, together with an excellent, far-sighted decision on the part of our dean, was instrumental in making the lab a success. It gives a real boost to our teaching capability. On the research side is our truly fabulous MBE lab. Several faculty, especially Mike Santos, have worked and are working very hard to make the lab an internationally visible success. But much of the credit for the beauty of this magnificent facility goes to Joel Young, our instrument shop supervisor. Evidence of Joel's skill and creativity is everywhere in the laboratory. The first samples are now being grown, so the lab is fully functional.

Not everything in 1993 was positive. Our high-energy group was dealt a grievous blow by the Congress when the SSC was killed. The sheer waste of years of effort and planning, the waste of money already spent, and the loss of expected new discoveries are cruel indeed. But the OUHEP group is already recovering! Some new funding, compensating partially for lost SSC money has already been granted the group and it is actively pursuing new avenues for research opportunities.

One of the most positive indicators for the Department's future is the University's 1993 decision to build an addition to Nielsen Hall. The first phase of the addition will contain two large lecture halls designed specifically for the teaching of physics and astronomy. The second phase will provide new space for modern teaching laboratories. Both phases will free up space in the present Nielsen Hall for faculty and student offices, seminar rooms, and new research laboratories. We hope that construction of the first phase will begin in 1994, allowing classes to be held in the new lecture halls by Fall 1995. Construction of an addition is a long-held departmental goal; it will permit us to improve our teaching and research missions substantially.

Ryan Doezema

Spring 1994 Schedule of Colloquium Speakers for the Department of Physics and Astronomy

(These colloquia are normally held on Thursdays 4:00-5:00pm - Nielsen Hall 211.)

Date	Speaker	Institution	Topic
2/10/94	Antonio Lagana	Italy	Atom/Mol Thy
2/17/94	Faculty Search		
2/24/94	Alexei Khokhlov	University of Texas	Turbulent Combustion in Supernovae
3/3/94	Friedel Thielemann	Harvard	Supernovae and Heavy Element Formation
3/10/94	SPRING BREAK		
3/17/94	Faculty Search		
3/24/94			
3/31/94	Barbara Whitten	Colorado College	Atom-Mol thy
4/7/94	Millard Alexander	U. Maryland	Atom-Mol thy
4/14/94			
4/21/94			
4/28/94	LAST COLLOQUIUM	BEFORE FINALS	

BITS and RAMblingS: The musings of a systems manager

Computers are ubiquitous (and taken for granted until they fail!) in the Department of Physics and Astronomy. That is probably assumed. But, what do we actually have and where are we headed with departmental computing? As a starting point, it is interesting to recall that our departmental computing began with the installation of a single VAX 11/780 with a whopping 4 Megabytes of memory and two 65 Megabyte disk drives in late 1979 or early 1980. When it was finally retired in January of 1991, it had 8 Megabytes of memory and 880 Megabytes of disk space.

Our situation has evolved from that one centralized machine to a network of about 25 (mostly Sun Microsystems) workstations each having at least 16 Megabytes (and some over 50 Megabytes) of memory and a total of about 30 Gigabytes of disk space. These comprise the core of the Nielsen Hall Network (NHN). They are attached by the NHN ethernet, which is currently undergoing the transition from being based on coaxial cable to

twisted pair cable connected by hubs on each floor. This will allow us to more easily determine trouble spots and also prepare us for replacing the Ethernet technology with some higher bandwidth technology (such as ATM) when that becomes necessary. We have the workstations set up so that any of our users can fairly transparently use any workstation as if it were the one on his/her desk. Thus, at any given time, one user may be running codes on all of our machines simultaneously. Because of this tremendous computing power, few of our faculty still utilize Cray computers around the country.

We still have some folks accessing our systems by RS-232 lines, either from terminals or PCs running terminal emulation software. However, we are increasingly adding ethernet cards to the PCs and these then have direct network connectivity. We even have some X-terminals with direct network connections in our terminal room in the basement.

We have recently stepped into the information age by setting up a gopher server. This is a program which allows us to specify data which we wish anyone on the Internet to access. Currently, not very much information is served, but we have plans to include full information about the department, including things like a description of our facilities, faculty vitae, course offerings, etc. For those who have gopher access, connect to phyast.nhn.uoknor.edu and look around. Another growing information protocol is WWW (world-wide web). We may convert to it in the future.

Any of our faculty can be contacted by their last name as lastname@phyast.nhn.uoknor.edu via our e-mail system (there are a few holdouts who do not use our computers, though!). If you need to contact the office, the address is office@phyast.nhn.uoknor.edu. If you have any questions about our network or computing facilities, you can e-mail postmaster@phyast.nhn.uoknor.edu.

Andy Feldt

JOHN'S JUNKETT: The wanderings of a nuclear astrophysicist

My trip to China in the fall involved aspects of both teaching and research. During 1992 I gave several invited colloquia on the east coast. One of those talks was at the physics department at Drexel University, and one of the professors there, a nuclear physicist, is Da Hsuan Feng. It turns out that he is the American organizer of a series of conferences or "schools" in China. The idea is to help elevate the Chinese, who have until recently not been actively involved in astrophysics. (Until the first conference on astrophysics in 1989 when one of my colleagues, Friedel Thielemann, lectured, there was little knowledge in China of what the important problems were in astrophysics.) In any case, Da Hsuan Feng invited me to be a lecturer at the Third Nankai Summer School on the Frontier Topics in Theoretical Physics, Tianjin, China during September 1993. (He did not tell me how much work it was going to be at the time, though.) The emphasis at the school was on astrophysics, and the lecture list included a broad spectrum of topics. I was asked to give 8 lectures, each about 50 minutes in length, at the school. (I went through more than 100 transparencies and now they tell me I have to write the lectures up for a book!) The lectures involved my research work on the formation of the heavy elements, the chemical evolution of the Galaxy, and the age of the Galaxy and the universe. The school was held at Nankai University in Tianjin, which is the third largest city in China, about the size of New York (perhaps a little larger in population). (Linda, who went with me, and I were housed on campus at the Foreign Experts Building. The first day I met two American students there from Oklahoma who were teaching English.) Tianjin is a port city, but not nearly as cosmopolitan as Beijing. The school ran for 10 days, and the students were all Asian, mostly from China, some from Taiwan, Hong Kong, etc. There were also some Chinese physics faculty from other institutions who attended the school. I met one professor, who brought his

student, who had ridden a train for 72 hours straight to get to the school. (They came from far western China near the Russian border.) All of the students, and faculty, had to apply to gain entrance to the school, so it was an interested group. We lectured from 8:30 am to 5 pm every day, with time off for lunch. The organizers of the school were very good to us, taking us out to banquets all of the time, and even to a chinese opera. (We ate exotic food everywhere we went.) Also, the president of Nankai University feted us at a banquet, toasted us and gave us presents. A lot more than I ever got from any OU president! Some of my memories include how genuinely friendly the Chinese were to us, and trying to negotiate on a bicycle with all of the thousands of Chinese. While most of the time was involved in lecturing at Nankai University on advanced topics to graduate students and researchers in astrophysics, I spent several days teaching junior and senior high school students in the city of Tianjin. This was an incredible experience, as the students were enthusiastic and very excited. I gave a presentation at the high school itself, where we were treated like royalty. The students greeted us at the door with flowers and applause, and we were asked for numerous autographs - much like visiting rock stars. (This was also shown on the television news in China.) It was, without a doubt, the most incredible teaching experience of my life. By the way, Linda also lectured about epidemiology, and she was a huge hit, as she was the only woman scientist in our group. The women school teachers, the woman principal and the female students were thrilled to meet Linda. They flocked around her, kissed her, and asked her for her autograph and address. We were also feted to still another banquet by the faculty of the high school - little English was spoken, but much beer was drunk, and communication improved as the evening wore on. The people in the community brought their children to the restaurant to see us westerners - we were big news to the locals. Finally, the principal of the high school, the owner of the restaurant, and some of the students at Nankai University showered us with gifts for our return home.

HEP at Langston University

The High Energy Physics program at Langston University presently consists of two PhD. physics faculty and eight students selected for their abilities and the degree of their potential benefit from the program. Langston University has been involved in conjunction with the University of Oklahoma on a research program to demonstrate a double-sided silicon microstripe detector as a working tracking device. To this end seven doubled-sided, DC-coupled devices were placed in a 227 GeV/c pion beam at Fermilab for a series of tests to evaluate signal-to-noise, charge sharing characteristics, charge correlation and positional resolution for a range of incident angles. Additional studies comparing analog and digital readout schemes, extracting and modelling information about the energy loss distribution as a function of detector thickness, and increasing understanding of diffusion characteristics were carried out.

At Langston the data acquired continue to be studied by the students in the program. In the spirit of training the students in multiple skills, a participating student typically works on several aspects of the project. The analysis portion of the project involves the use and application of Monte Carlo programs simulating the devices for comparison to data, and histogramming and fitting software for data presentation. The student participants have refined the Monte Carlo programs to more closely simulate the data distributions which have been produced by analyzing the data subject to certain selection criteria.

Continuing in parallel with the data analysis is the effort at Langston to make operational a complete silicon microstrip detector with readout electronics. Presently this effort is focusing on debugging and testing the SRS and SDA data acquistion modules for the SVX readout electronics. Mounted on CAMAC extenders these modules are probed by the students with the aid of schematics, an oscilloscope, and logic analyzer to determine whether the proper execution of microcode downloaded from the host computer to the sequencer is taking place. Here the hands-on

experience of debugging digital electronics complements the knowledge of CAMAC and microcode programming necessary to do the job. In order to test the response of these modules to signals input from the front connectors, the design and construction of a simple digital CAMAC module to provide the signals was undertaken and completed by a team of students.

These activities are in line with our general thrust for the OU/LU-"tuple" to construct, test, and run a "Phase-0 Silicon Vertex Module". This follows on the "BCD" like device, as described in the letter-of-intent to the SSC laboratory, LOI-0008. To implement such a Phase-0 device, we will have to move into real VLSI and silicon detector testing, including the appropriate data taking, event display and analysis software. We intend to utilize our Langston students to help us do this.

This cadre of trained students, augmented by newly entering students to be trained, will be a resource that could be used for testing and quality control of silicon devices and readouts for OU and LU's involvement in future experiments, possibly D0 at Fermilab. Of course, these students have been exposed to basic and applied science, electronics and engineering. We can hope that this will entice most, if not all, of these students to continue their professional lives as scientists or engineers of some variety or other.

George Kalbfleisch

THE PAPER CHASE: RECENT PUBLICATIONS

"Hall Insulator in a Two-Dimensional System in Silicon in the Extreme Quantum Limit", Phys Rev B Rapid Comm., in press, 1994.

"Quantum Effects in Ar+HF Rotationally Inelastic Scattering: A Semiclassical Interpretation", by J.J.C.Barrett, H.R.Mayne, and M.Keil, Journal of Chemical Physics, 100, 304 (1994).

Finite-Element Quantum Electrodynamics II. Lattice Propagators, Current Commutators and Axial-Vector Anomalies, by Dean Miller, K. A. Milton, and S. Siegemund- Broka, submitted to Physical Review D.

"Quantum Effects in Ar+HF Rotationally Inelastic Scattering: A Semiclassical Interpretation" by J.J.C.Barrett, H.R.Mayne, and M.Keil, was published by the Journal of Chemical Physics in volume 100, page 304 (1994).

"On the Relative Frequencies of Spectroscopically Normal and Peculiar Type Ia Supernovae", D. Branch, A. Fisher, and P. Nugent 1993, Astronomical Journal, 106, 2383

"Interpretation of the Early Spectra of SN 1993J in M81", E. Baron, P.H. Hauschildt, D. Branch, R.M. Wagner, S.J. Austin, A. Fillipenko, and T. Mathewson 1993, Astrophysical Journal, 416, L21

"SN 1992A: Ultraviolet and Optical Studies Based on HST, IUE, and CTIO Observations, R.P. Kirshner, D. Branch, et al. 1993, Astrophysical Journal 415, 589

"Variability of the Nuclear Radio Source in M31," C. Crane, J. J. Cowan, J. R. Dickel and D. A. Roberts Astrophys. J. Letters, 417, L61 (1993).

"Heavy Element Abundances in Low-Metallicity Stars," J.J. Cowan, in Nuclear Physics in the Universe, eds. M. Guidry and M. Strayer (Institute of Physics: Bristol), 203 (1993).

"Peculiar motions in superclusters: Perseus-Pisces", C Baffa, G. Chincarini, R.B.C. Henry, and J. Manousoyanaki, Astron. & Astrophys., 280, 20 (1993).

"H II regions in spiral galaxies: positions, luminosity function and diameter distribution", M Banfi, R. Rampazzo, G. Chincarini, and R.B.C. Henry, Astron. & Astrophys., 280, 373, (1993).

COLLOQUIA, PRESENTATIONS

"Type Ia Supernovae as Standard Bombs?", David Branch, Space Telescope Science Institute, 9/93.

"Type Ia Supernovae as Standard Bombs?" David Branch, Rice University, 10/93.

"Nonperturbative quantum field theory", Kim Milton, OSU, 10/27/93.

"The formation, evolution, and age of the heavy elements", John Cowan, Carnegie Observatories, Pasadena, 10/93.

"Rotationally inelastic scattering of hydrogen fluoride as probed by a hydrogen fluoride chemical laser", Mark Keil, SPIE Conference on Laser Techniques, Los Angeles, 1/94.

"The Deceleration Parameter from SN Ia Photometry?", Tom Vaughan and David Branch, poster presented at January meeting of the American Astronomical Society, Washington, D.C.

"The Type Ia Supernovai in IC 4182 and NGC 5253 and the Value of the Hubble Constant", Pete Nugent, Adam Fisher, and David Branch, poster presented at January meeting of the American Astronomical Society, Washington, D.C.

"The Hubble Constant from Nickel Radioactivity in Type Ia Supernovae", Adam Fisher, David Branch, and Pete Nugent, poster presented at January meeting of the American Astronomical Society, Washington, D.C.

"Type II Supernova Light Curves: Influence of the He Core Mass", Tim Young, Ed Baron, and David Branch, poster presented at January meeting of the American Astronomical Society, Washington, D.C.

"Spectral Analysis of 1993J", Ed Baron and David Branch, poster presented at January meeting of the American Astronomical Society, Washington, D.C.

DEPARTMENT VISITORS

Kim Milton: Peter Rosen (UT Arlington), Carl Bender (Wash. U), John Ralston (Kansas), and Tai Wu (Harvard).

Dick Henry: Mike Edmunds (Cardiff), November.

David Branch: Abi Saha (STSci), January.

Deborah Watson: Chris Greene (JILA), January.

Greg Parker: Antonio Lagana, Perugia, Italy, January.

PROPOSALS FUNDED

David Branch, NSF, $43,000.

PUBLIC LECTURES

"The Demise of the SSC", Kim Milton, Rotary Club of Ardmore.

"SN1987A: The Story of an Exploding Star", Pete Nugent, 11/93.

"Grand Tour of the Solar System", Bill Romanishin, Norman Public Library, November, 1993.

"A New Optical Jet in a BL Lac Object?", Bill Romanishin, Okie-Tex Star Party, Lake Murray, OK, October, 1993.

"A New Optical Jet in a BL Lac Object?", Bill Romanishin, Triple Conjunction Planetarium Conference, November, 1993.

"Our Changing Perspectives of the Universe", Dick Henry, OU's Mornings With The Professors series, 1/94.

RESEARCH TRAVEL, MEETINGS ATTENDED

Mark Keil, SPIE conference on "Laser Techniques For State-Selected And State-To-State Chemistry", Los Angeles, January 26-29 (a near miss!)

David Branch, meeting of the Supernova INtensive Survey (SINS) Hubble Space Telescope group, Maine, fall (of course!).

Dick Henry, Canada-France-Hawaii telescope, Mauna Kea, Hawaii, to obtain spectra of H II regions in two cluster (Abell 262) spirals (four

beautifully clear nights!).

Jim Buell, Adam Fisher, Pete Nugent, Tom Vaughan, and Tim Young attended the January meeting of the American Astronomical Society, Washington, D.C. and presented posters.

JURY DUTY

John Furneaux, January.

UPDATE ON THE KEIL GROUP

Mark Keil, Tommy Ericson, and Kyle Copeland are continuing the characterization of our high-temperature atomic fluorine source. They have solved its heating and sealing difficulties and have discovered that sapphire resists the atomic fluorine as well as does pure nickel---the only material previously thought resistant to elemental fluorine at 700degC. They are currently trying to solve mechanical difficulties with calcium and magnesium fluoride crystals that are more chemically resistant, whereupon we would have an atomic source suitable for our chemically reactive scattering studies. Simultaneously, their scattering apparatus and laser have been re-aligned in preparation for preliminary scattering measurements. Their experimental work has been immeasurably enhanced by the expertise and care of the Departmental machine shop; they are particularly indebted to Joel Young for his advice and skill.

SPRING NEWSLETTER

The spring edition of the Phyast Phlyer will be published in early May. I would appreciate hearing from more alumni. Tell us what you're doing, where you're doing it, and with whom.