ΦYAST ΦLYER

The Department of Physics & Astronomy

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FROM THE EDITOR

This is the first issue of the newly instituted newsletter of the Department of Physics and Astronomy at OU. The purpose of this publication is to keep interested folks both inside as well as outside of the Department informed of our activities. If you, as either student, faculty member, alum, or staff have any item which you feel would be of interest to our readers, please send it to me at the Department. Currently, the plan is to publish quarterly. If demand and information overload require, the frequency will increase.

Dick Henry

COLLOQUIUM SCHEDULE - FALL

10/8	P. Hauschildt	ASU
10/15	R. Westman	UCSD
10/22	B. Murray	JPL
10/29	T. Pal	SSC
11/5	J. Ralston	KU
11/12	H. Maine	UNH
11/19	A. Fridman	CERN
11/26	Thanksgiving	
12/3	K. MacAdam	UKen

Departmental colloquia are scheduled every Thursday and begin at 4pm. Tea and cookies are served at 3:30.

WELCOME NEW INQUIRING MINDS

Fifteen new graduate students have joined the Department since last January. **Francesca Boffi, Terry Downard, Steve Richichi, Adolfo Rodriguez,** and **Brian Taylor** began in the spring, **Kristyn Baker, Kory Goldammer, John Olson, Chris Stockdale,** and **John Walkup** in summer, and **Cindy Anderson, Debra Burris, Ping Long, Yuxin Qin, and Kevin Sullivan** started this fall.

NEW POSTDOCS

This fall, three postdocs joined the Department. **Jiuru Han** and **Bill Ross** are working with **Pat Skubic**, while **Weiguo Sun** has joined **Mike Morrison** in his work.

FOCUS ON ATOMIC PHYSICS

The big news this fall in the atomic, molecular, and chemical physics group is the arrival of a new faculty member. **Mark Keil** left his position at the University of Alberta in Edmonton (Canada) to join the faculty here at OU as an Associate Professor. Mark's research expertise in experimental heavy-particle collisions and his interest in studying reactive scattering beautifully complements the theoretical program at OU led by **Greg Parker**, and Mark and Greg are already discussing future collaborations and proposals. Elsewhere in the group, experimentalist **Maureen O'Halloran** has continued her multiphoton probes of molecular spectroscopy and dissociation and theorist **Deborah Watson** has (in addition to a new son, Mark) several fascinating results in collaborations with postdoc **Martin Dunn** and colleagues Dudley Hershbach and David Goodson on the quantum mechanics of infinite-dimensional Hilbert spaces. Theorist **Michael Morrison** returned in July from a sabbatical as a Visiting Fellow at the Joint Institute for Laboratory strophysics where he initiated new research programs involving orientation and alignment in electron-atom scattering and heavy-particle collisions involving Rydberg states--projects that augment his ongoing theoretical studies of electron-molecule collisions. Michael returned to OU in a new position, as a Professor of Physics and General Education and Adjunct Professor of English, and will be alternating his teaching duties in the two Departments. In addition, he is currently beginning work on the second volume of his undergraduate quantum textbook series. Joining his research group this fall is a new postdoc, **Weiguo Sun.** Weiguo received his PhD from Ohio State University and came to OU from the Lawrence Livermore National Laboratory.

Mike Morrison

GRADUATE STUDENT NEWS: Focus on Astronomy

During the week of 9/21, **Tim Young** presented a talk on supernova light curve fitting at a workshop held at Oakridge. Tim has some interesting results concerning Type II light curves and very massive stars.

Doug Miller returns to Germany in October for two months to continue his work on non-LTE synthetic spectrum synthesis. Hopefully, he'll be returning to Norman with some good results and his thesis. He also plans to present a poster on Type Ia's as Standard Candles this January at the AAS meeting in Phoenix. His poster will be an update of a recent paper he wrote on this subject with **Dave Branch.**

Tom Vaughan and **Pete Nugent** are continuing work on Late-time Type Ia supernovae. They are examining the possibility of forbidden Fe lines forming only two months after maximum light.

Jim Buell attended an Aspen conference on stars in July, where he conferred with Prof. Renzini from Bologna concerning the modeling of intermediate mass stars. Jim is currently reviving and revising Renzini's code in hopes of studying the nucleosynthesis of carbon and nitrogen in stars. Jim has also recently finished a statistical analysis of empirical information on roughly 100 planetary nebulae. He and **Dick Henry** are writing up the results for publication.

Dave Minard has been working with **Bill Romanishin** on photometric studies of galaxies, using numerous CCD images Bill has collected. **Scott McCartney** has begun working with **Tibor Herczeg** on Wilson Devinney models of binary stars. **Tad Thurston** is currently using photoionization modeling techniques to interpret his recent statistical study of Crab Nebula filaments with **Dick Henry**. **Joe Howard** is compiling abundance information on the spiral galaxy M101 in an effort to study the functional form of its abundance gradient.

Francesca Boffi, one of our new graduate students, attended the international conference on planetary nebulae in July, in Innsbruck, and presented a poster on her work on filling factors for these objects.

Pete Nugent

VISITORS

Carl Bender (Washington Univ., St. Louis): HEP
Greg Atkins (Franklin & Marshall): HEP
Jim Slinkman (IBM): SS
Gustav Tammann (Basel): ASTR
Grant Matthews (LLNL): ASTR
Bernard Pagel (NORDITA): ASTR

DID YOU KNOW?

The Physics and Astronomy Department has awarded 60 Bachelor's degrees in Engineering Physics since 1982.

BACK TO CAPISTRANO

This fall we welcome back two of our faculty members. **Mike Morrison** spent a sabbatical year at JILA in Bolder getting new projects underway (see FOCUS ON ATOMIC PHYSICS). **John Cowan** took a year's leave of absence to be at Columbia University in New York.

THE PAPER CHASE: RECENT PUBLICATIONS

"Determination of Subband Spacing in Inversion Layers on p-type InAs", by Bu, Zhang, Mason, and Doezema, *Phys. Rev.* B 45, 11336 (1992).

"The Maxwell-Chern-Somons Casimir Effect. II. Circular Boundary Conditions", Milton and Ng, *Phys. Rev.* D 46, 842 (1992).

"Finite-Element Quantum Electrodynamics. I. Canonical Formulation, Unitarity, and the Magnetic Moment of the Electron", Milton, Miller, and Siegemund-Broka, *Phys. Rev.* D 46, 806 (1992).

"Delta Expansion Applied to Quantum Electrodynamics", Milton, Bender, and Boettcher, *Phys. Rev.* D 45, 639 (1992).

"The Delta Expansion for Local Gauge Theories. II." *Phys. Rev.* D 45, 1261 (1992).

"Delta Expansion for Local Gauge Theories. I.", Milton, Bender, Cooper, Moshe, Ponsky, and Simmons, *Phys. Rev.* D 45, 1248 (1992).

"Heavy Element Nucleosynthesis and Galactic Chemical Evolution", Mathews, Bazan, Cowan, and Schramm, *Physics Reports*, in press (1992).

"Operation of the R-Process and Cosmochronology", Thielemann, Bitouzet, Kratz, Moller, Cowan, and Truran, *Physics Reports*, in press (1992).

"S- and R-Process Contributions in Extinct Radioactivities", Cameron, Thielemann, and Cowan, *Physics Reports*, in press (1992).

"A VLA Search for Young Galactic Supernova Remnants", Sramek, Cowan, Roberts, Goss, and Ekers, *Astron. J.*, 104, 704 (1992).

"Evolution of Heavy-Element Abundances as a Constraint on Sites for Neutron Capture Nucleosynthesis", Mathews, Bazan, and Cowan, *ApJ*, 391, 719 (1992).

"Detection of an Unresolved Nuclear Radio Source in M31", Crane, Dickel, and Cowan, *ApJ Letters*, 390, L9 (1992).

"Multichannel Quantum Defect Calculations Using a Smooth Reaction Matrix", Goforth and Watson, *Phys. Rev.* A 46, 1237 (1992).

"Progenitor Masses of Type Ib/c Supernovae", Baron, *MNRAS*, 255, 267 (1992).

"The Collapse of White Dwarfs to Neutron Stars", Woosley and Baron, *ApJ*, 370, 228 (1992).

"Flux Limited Diffusion in Hydrodynamics", Cooperstein and Baron, in press (1992).

"The Hubble Constant from Nickel Radioactivity in Type Ia Supernovae", Branch, *ApJ*, 392, 35 (1992).

"Type Ia Supernovae and Cosmic Peculiar Velocities", Miller and Branch, *AJ*, 103, 379 (1992).

"A Critical Review of Selected Techniques Used for Measuring Extragalactic Distances", Jacoby, Branch, Ciardullo, Davies, Harris, Pierce, Pritchet, Tonry, and Welch, *PASP*, 104, 599 (1992).

"Chemical Evolution of Virgo Cluster Spirals I.: NGC 4303", Henry, Pagel, Lasseter, and Chincarini, *MNRAS*, 258, 321 (1992).

"Far-UV Observations of the Crab Nebula", Blair, Long, and Henry, *ApJ*, in press (1992).

DID YOU KNOW?

Our Department has awarded 26 PhD degrees since 1986. Twenty-two of these folks are presently teaching or doing research in physics, astronomy, or a closely-related area.

GRANTS AWARDED: $$$

Doezema, Fischbeck, Furneaux, and **Mason** (Physics & Astronomy); Frech and Glatzhofer (Chemistry); Batchman, McCann, and Sluss (EE); O'Rear (Chem. E.); "Laboratory for Electronic Properties of Materials", (MBE grant) from NSF and State of Oklahoma, $2,286,000 (3-years).

Kalbfleisch, URIP (DOE) $128,000 + $50,000 OU match.

Milton, HEP/Theory (DOE) $115,000.

Watson, "Highly Correlated Systems", NSF, $20,000 for 3 years.

Branch, "Quantitative Analysis of Supernova Ultraviolet Spectra", NASA,
$35,000, 1 year.

Branch, "Supernova INtensive Study", $52,000, Harvard University.

TEACHER'S WORKSHOP HELD

A three week workshop entitled "Properties of Matter: Physics by Inquiry for Middle School Teachers", was held in June. **Steve Whitmore, Stu Ryan, and Jack Cohn** organized the course, which was attended by 24 teachers from around the state. The workshop was funded by the State Regents for Higher Education.

INVITED TALKS

Watson, "New Developments and Challenges of Two-Electron Atoms and Ions", presented at a JILA workshop in July.

Baron, "Progenitors of Type Ib/c Supernovae", presented at Institute for Nuclear Theory, Seattle, on the 5th anniversary of SN1987A in February.

Branch, "Supernovae as Probes of the Universe", presented at the Phi Lambda Upsilon honors banquet, Department of Chemistry & Biochemistry, OU, in April.

Cowan, "The Formation of Heavy Elements in Exploding Stars", presented at APS/AAPT meeting in Washington, April.

Milton, "Finite-element Quantum Field Theory", presented at Quarks 92 workshop in Moscow, June.

MEETINGS ATTENDED

Milton, Quarks 92, Moscow, June.

Watson, JILA workshop in July; DAMOP, Chicago, in May; Hershbach's 60th Birthday Symposium, Cambridge, in July.
Baron, Fifth Anniversary of SN1987A, Seattle, February.

Cowan, Workshop on Galactic Chemical Dynamics, Clemson, May.

NIELSEN AWARD TO ROBERTS

Doug Roberts was awarded the Department's Nielsen Award in May, for his PhD thesis "A Study of the Neutral and Ionized Gas in the Interstellar Medium and Galactic H II Regions." The Nielsen Award is presented to doctoral graduates whose theses are considered by the faculty as outstanding in quality and impact. As part of the award, Doug will return to Norman in the near future to present a colloquium on his work. Doug was a student of **John Cowan's**, and is currently a postdoc at the University of Illinois.

FOWLER PRIZE

The first annual prize to the outstanding senior student in the Department was presented last April to **John Olson**. The prize is named in honor of Professor Emeritus Dick Fowler, whose generous gift, plus outside donations, made it possible.

ALUMNI NEWS WANTED

Part of the purpose of this Newsletter is to feature activites of our alums. To this end, information about professional activities of our graduates are hereby solicited. Please send news about projects, research, teaching, publications, etc. which you are involved in to Dick Henry, Department of Physics and Astronomy, University of Oklahoma, Norman, OK 73019.