"All the ν's

That's fit to Print"

ΦYAST ΦLYER

The Department of Physics & Astronomy

The University of Oklahoma

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LIN SYMPOSIUM UPDATE

The Lin Symposium, scheduled for October 13-14, 2000, is rapidly approaching. If you are planning to attend this event and have not registered, please call or email Linda Christie (405-325-3961 x36131; Christie@nhn.ou.edu) as soon as possible, since registration forms were due September 22.

Parking for the Symposium, which begins at 1:30pm Friday afternoon in A102 Nielsen Hall, is at the Elm Street garage, one block north of Nielsen Hall on the west side of the street. A limited number of cars can be parked in the faculty/staff gated lots at the corner of Elm and Brooks just west of Nielsen Hall and in the Gittinger and Dale Hall lots just south of Nielsen. Graduate students will be manning the gates to these lots to help Symposium participants enter between 12:00 noon and 2pm Friday. All these lots will be open after 5pm Friday and all day Saturday.

FOUR NEW FACULTY MEMBERS JOIN DEPARTMENT!

The Department welcomed four new assistant professors into its ranks this fall. Brad Abbott and Chung Kao join the High Energy group, while Karen Leighly and Yun Wang become members of the Astrophysics group. Here is some brief information on each.

Brad Abbott is a high energy experimental physicist who enjoys building the hardware necessary to run experiments as well as analyzing the resultant data. He is currently working on the D0 experiment and CP violation, an attempt to explain the existence of the Universe. Brad grew up in Morris, MN, home of the U. of MN—Morris campus, where he received his undergraduate degree in Physics. After earning his PhD at Purdue, Brad had one postdoc at NYU working on D0 at Fermilab between 1995-1997, followed by another at LBL working on the BaBar experiment at

SLAC from 1998 until this summer. Brad's wife Cindy is a practicing nurse. The Abbotts enjoy hiking and camping.

Chung Kao's research deals with particle theory, especially the Higgs mechanism. A theorist, he is also interested in supersymmetry and grand unification. Chung's PhD is from the University of Texas (1990), where he remained for one year as a postdoc. Following that, he was a postdoc at Florida State (1991-1994) and the University of Rochester (1994-1996) before becoming a Visiting Assistant Professor in research and teaching at the University of Wisconsin, Madison, from 1996 until his transfer to OU. Originally from Taiwan, Chung has an 11 year old daughter. He enjoys listening to classical musical, as well as playing bridge and Go, a Chinese game.

Karen Leighly, originally from Rolla, Mo., comes to us from Columbia University, where she has been serving as an Associate Research Scientist in the Astronomy Department since 1997. Karen's research focuses on narrow-line Seyfert galaxies, a subset of active galaxies all of which are highly energetic (luminous) objects whose energy source is believed to be accretion of matter onto a supermassive black hole. She is particularly interested in using X-ray observations to infer the accretion rate of this material. Karen received her doctorate from Montana State in 1991, and was an NRC postdoc at Goddard from 1992-1994 and a Science and Technology postdoc at the Institute of Physics and Chemistry Research in Wako-shi, Japan, between 1995-1996. Karen enjoys jogging and swimming.

Yun Wang grew up in the southwest countryside of P.R. China. She received her bachelor's degree in Physics from Tsinghua University, Beijing, and her PhD from Carnegie Mellon University. Yun is a theoretical cosmologist with specific interests in the cosmic microwave background anisotropy, inflation, dark matter, gravitational lensing, and supernovae as cosmological probes. Between 1985 and 1996 she served in three Research Associate positions at Carnegie-Mellon, University of Florida, and NASA/Fermilab Astrophysics Center. This was followed by two years as a visiting Research Fellow in Astrophysical Sciences at Princeton and most recently as visiting Assistant Professor at Notre Dame. Yun is a published poet, loves classical music, and is married and has one daughter.

RECENT PHD'S AND MASTERS AWARDED

Thomas Vaughan (Branch) defended his thesis, "The Sobolev Approximation in a Spherical Shell Expanding with Constant Radial Velocity", last spring. Thomas is currently working for the National Severe Storms Lab in Norman.

Kazuhito Hatano (Branch) defended his PhD thesis on "The Direct Analysis of the Spectra of Type Ia Supernovae" in July. In December he'll become a postdoctoral fellow at the Research Center for the Early Universe at the University of Tokyo

Stephen J. Richichi (Skubic) defended his thesis "Inclusive Production of Charged Kaons from B Decays", during the summer and in turn presented his results at the B Quark Parallel Session of DPF2000 in Columbus Ohio on

August 12, 2000.

Matt Price got his masters degree over the summer. His thesis was “Direct Photon Cross Section Measurements from proton-antiproton Collisions with a Center of Mass Energy of 630 GeV at D-Zero”. He has recently returned to Oregon with his family to live.

BYE BYE BONDY

After over 13 years as steadfast advisor to our graduate and undergraduates, Grettie Bondy left our Department this summer to assume a new position as Undergraduate Academic Advisor with the Department of English. Besides advising, Grettie is involved in recruitment and retention efforts in English. She is also a member of their Undergraduate Studies Committee and will soon be reactivating the Undergraduate English club, sort of an SPS type group without all the equations. Many a Physics student, not to mention faculty member, owes Grettie for helping him/her get through bureaucratic fog in addition to always offering a cheerful word of support. Grettie’s new email address is: gbondy@ou.edu. She will be missed, but we are happy to…

WELCOME CLARISSA!

The Physics and Astronomy Department wishes to welcome our newest addition to the Office Staff - Clarissa Carr. Clarissa is replacing Grettie Bondy. Clarissa will be handling all undergraduate and graduate students' files and related issues. She comes to us with much experience in this field. Be sure to welcome her to our department if you get the chance!

NEW OBSERVATORY WEBSITE

There is now a website for the OU Observatory. This will give information on OU happenings related to astronomy and space, such as public talks, and also links to sites of general astronomy/space interest. The URL is easy to remember: observatory.ou.edu. It’s being maintained by Bill Romanishin.

ALUMNI NEWS

From John Walkup: After finishing my Ph.D. in April, I was hired as Professor of Physics at the Oklahoma School of Science and Mathematics. There, I am joining Xifan Liu, a former OU graduate, and Fred Brown, who is currently finishing his Ph.D. at OU. At OSSM I am currently mentoring four students in approximation theory and Java-programming. Bruce Mason recently hired me for a post-doc position with MERLOT (an online repository of web-based educational resources). Both jobs mesh very well since I am implementing web-based educational techniques into my teaching at OSSM. One technique is to introduce assignments based on physics applets that are categorized at MERLOT. The other involves group learning on the Web, for which I have implemented an online discussion board for the students to discuss their group assignments.

BITS FROM NIELSEN HALL NETWORK

We have a few changes around here recently. First, our X-Terminals and printer have moved from B4 to the newly renovated office in the southern half of what used to be Room 211 (where our colloquia where formerly held). We have 4 X-Terminals with 19" monitors and 3 older, smaller ones. There are rumors that the older ones may get replaced by Sun workstations.

Another change is not so visible, but will impact our network for the better in any case. We have upgraded our backup system so that we can now handle about 500 Gb of backups. Our new faculty members have almost doubled our backup needs, prompting our upgrade. The new tape system can put 60 Gb on a single tape (uncompressed!). Our current backup needs are about 200 Gb, so we still have some room for growth.

Andy Feldt

RESEARCH NEWS

Recent Publications

L. Gamberg, G. R. Kalbfleisch, and K. A. Milton, "Direct and Indirect Searches for Low Mass Magnetic Monopoles," Foundations of Physics, 30, 543-566 (2000) [Kurt Haller's Festschrift]

K. A. Milton, I. L. Solovtsov, and O. P. Solovtsova, "Timelike and Spacelike QCD Characteristics of the e^+-e^- Annihilation Process," Eur. Phys. J. C 13, 497-502 (2000)

K. A. Milton, I. L. Solovtsov, O. P. Solovtsova, and V. I. Yasnov, "Renormalization Scheme and Higher Loop Stability in Hadronic Tau Decay with Analytic Perturbation Theory," Eur. Phys. J. C 14, 495-501 (2000)

I. Brevik, K. A. Milton, S. D. Odintsov, and K. E. Osetrin, "Dynamical Casimir Effect and Quantum Cosmology," Phys. Rev. D 62, 064005-1--8 (2000)

E. J. Lentz, E. Baron, D. Branch, P. H. Hauschildt, and P. Nugent, “Metallicity Effects in NLTE Model Atmospheres of Type Ia Supernovae”, Ap. J., 530, (2000), 966-976.

T. Barman, P. H. Hauschildt, and E. Baron, “A Grid of NLTE Model Atmospheres for White Dwarfs in Cataclysmic Variables”, Ap. J., 537, (2000), 946-952.

"Branch-point structure and the energy characterization of avoided crossings", J.R. Walkup, M. Dunn, and D.K. Watson. Journal of Mathematical Physics 41, 218(2000).

"Local optimization of the summation of divergent power series", J.R. Walkup, M. Dunn, and D.K. Watson. Journal of Mathematical Physics 41, 56814 (2000).

C. Sneden, G. H. Smith, J. Johnson, R. P. Kraft, J. J. Cowan, and M. S. Bolte, “Neutron-Capture Element Abundances in the Globular Cluster M15," Astrophys. J. Letters, 536, L85 (2000)

"RXTE Observation of NGC 6240: a search for the obscured active nucleus", Y. Ikebe, K. Leighly, Y. Tanaka, T. Nakagawa, Y. Terashima & S. Komossa, Aug. 2000, MNRAS, 216, 433

S.J. Chung, N. Dai, G.A. Khodaparast, J. Hicks, K.J. Goldammer, F. Brown, W.K. Liu, R.E. Doezema, S.Q. Murphy, and M.B. Santos,

"Electronic Characterization of InSb Quantum Wells," Physica E 7, 809 (2000).

N. Dai, G.A. Khodaparast, F. Brown, R.E. Doezema, S.J. Chung, and M.B. Santos, "Band Offset Determination in the Strained-Layer InSb/AlInSb System," Appl. Phys. Lett. 76, 3905 (2000).

Michael A. Morrison, Eric G. Layton, and Gregory A. Parker, “Rydberg electron interferometry," Phys. Rev. Lett. vol 84, 1415—1418 (2000).

Neil E.~Shafer-Ray, Michael A. Morrison, and Gregory A. Parker, “A classical ensemble model of three-body collisions in the point contact approximation and application to alignment effects in near-resonant energy transfer collisions of He atoms with Rydberg Ca atoms," Journal Chemical Physics vol. 113, 4274-4289 (2000).

Gregory A. Parker, Mark Keil, Michael A. Morrison, and Stefano Crocchianti, “Quantum reactive scattering in three dimensions: Using tangent-sphere coordinates to smoothly transform from hyperspherical to Jacobi regions." Journal Chemical Physics vol. 113, 957-970 (2000).

Rotation Rates of Kuiper Belt Objects from Their Light Curves. NATURE, (1999), 398, 129. (W. Romanishin and S. C. Tegler)

1998 WV24. Minor Planet Electronic Circ., 1999-V06 (1999) (Romanishin, W., Tegler, S., Sheppard, S., Marsden, B. G.)

1998 WH24. Minor Planet Electronic Circ., 1999-V03 (1999) (Romanishin, W., Tegler, S., Sheppard, S., Marsden, B. G.)

1998 VG44. Minor Planet Electronic Circ., 1999-V02 (1999) (Romanishin, W., Tegler, S., Sheppard, S., Marsden, B. G.)

CLIMBING THE MOUNTAIN

Two books devoted to Julian Schwinger were published this summer. The first, "Climbing the Mountain: The Scientific Biography of Julian Schwinger," coauthored with Jagdish Mehra, was published by Oxford University Press in June, although just released in North America in August. In 677 pages it describes the life and work of Julian Schwinger, my Ph.D. advisor (at Harvard) and postdoc supervisor (at UCLA), who shared the Nobel Prize with Feynman and Tomonaga for their development of renormalized quantum electrodynamics. Actually, Schwinger was the first to solve the problems of QED, and had, I believe, a more profound influence on theoretical physics than did Feynman. Certainly, he had many more and influential students than did Feynman. However, Dick was a showman, and Julian was a retiring sort, so his influence is less conspicuous. This book attempts to correct that imbalanced impression. The book is semitechnical, with a fair number of equations, roughly at the level of Schweber's excellent "QED and the Men Who Made It: Dyson, Feynman, Schwinger, and Tomonaga" (Princeton, 1994). [ISBN: 0 19 850658 9. $80] A companion volume was published in June by World Scientific: "A Quantum Legacy: Seminal Papers of Julian Schwinger." It contains reprints of some 44 of Schwinger's most important papers, together with some 100 pages of commentary by me. It is a complement to an earlier selection of his papers (no papers in common were chosen): "Selected Papers (1937-1976) of Julian Schwinger" ed. C. Fronsdal, M. Flato, and K. A. Milton (Reidel, Dordrecht, 1979). [ISBN: 981-02-4006-6. $99]

Kim Milton

Conferences/Workshops Attended

Milton: Fradkin Memorial Conference, Moscow, June 5-10, 2000 Opening Plenary Talk: "Dimensional and Dyamical Aspects of the Casimir Effect: Understanding the Reality and Significance of Vacuum Energy". Also, XXXth International Conference on High Energy Physics, Osaka, July 27-August 2, 2000 "New Limits on the Production of Magnetic Monopoles at Fermilab"

Cowan and Henry: June meeting of the American Astronomical Society in Rochester, NY.

Baron: E. Baron, E. Lentz, and R. Thomas attended the Workshop on Thermonuclear Supernovae at the European Centre for Theoretical Studies in Nuclear Physics and Related Areas (ECT*) in Trento, Italy in July. Eddie says, “It was a productive workshop for all. The ECT* is in a restored 17^{th} century Villa that was occupied by the infamous ‘Red Brigades’ during the 1960s. The atmosphere was pleasantly informal. Rollin Thomas announced on the first day that he might not do a thesis on supernovae and I would have never known that astronomers could be hard nose salesmen. They went right to work on him and he saw the light. Thank god they weren't selling insurance. He even went so far as to say that Italy was now on ‘his list of countries that don't suck.’ It was Eric's first trip to Europe and once he got a passport he enjoyed it very much.”

Branch: In July, at the University of California at Berkeley. Workshop of SINS - the Supernova INtensive Study with the Hubble Space Telescope.

Branch and Baron: In July, at the Lawrence Berkeley National Lab, a meeting of the SNAP Working Group on Core Collapse Supernovae (SNAP being a proposed orbiting observatory dedicated to the study of supernovae.

Leighly: "Probing the Physics of Active Galactic Nuclei by Multiwavelength Monitoring", 20-22 June 2000 at NASA Goddard Space Flight Center in Greenbelt, Maryland. Also, AAS 196th Meeting: New Faculty Workshop, 3-4 June 2000 in Rochester, NY.

Doezema: APS and AAPT Conference of Physics Department Chairs: "Undergraduate Physics in the New Century." American Center for Physics, College Park, MD. April 14-16, 2000.

Stephane Mazevet, Michael A. Morrison, and Robert K. Nesbet: Division of Atomic, Molecular, and Optical Physics meeting, June 2000 at University of Connecticut, where they presented “Application of the nonadiabatic phase matrix method to vibrational excitation in e-CO_2 scattering below 10eV”.

Romanishin, along with OU undergraduates Julie Rupert, Zach Blankenship,and Chris Henry (now a grad student at UT Austin) attended the Minor Planet Workshop held at Alfred University, New York, in June 2000.

Watson: DAMOP, Division of Atomic, Molecular and Optical Physics June 14-17, 2000, University of Connecticut.

Colloquia, Papers Presented

Baron: Radiation Transport in Type Ia Supernovae: Current Status and Future Prospects, Invited Talk, Workshop on Thermonuclear Supernovae, European Centre for Theoretical Studies in Nuclear Physics and Related Areas (ECT*), Trento, Italy, July, 2000. Also, Type II Supernovae as Cosmological Probes in the 21st Century, Colloquium at Univ. of Padova, July, 2000.

Lentz: Spectral Modeling of Type Ia Supernovae: Current Status and Future Prospects, Invited Talk, Workshop on Thermonuclear Supernovae, European Centre for Theoretical Studies in Nuclear Physics and Related Areas (ECT*), Trento, Italy, July, 2000.

Branch: invited talk on "Physical Properties of Type Ia Supernovae" at the 9th Marcel Grossmann Conference, in Rome.

Henry: “A New Look At Carbon Abundances In Planetary Nebulae”, poster presented at June, 2000, meeting of AAS, Rochester, NY.

Cowan: Two posters presented at the June, 2000, AAS meeting in Rochester, NY: J. W. Truran and J. J. Cowan, “The Helium r-Process and Neutron-Capture Element Abundances in Low Metallicity Stars”;and R. S. French, C. Sneden, J. J. Cowan, J. E. Lawler, F. Primas, T. C. Beers and J. W. Truran, “Neutron-Capture Elements in Very Metal-Poor Halo Stars”.

Watson: Papers presented at DAMOP, "Local optimization of the summation of divergent perturbation series", J.R. Walkup, M. Dunn, and D.K. Watson. And, "Beyond the Gross-Pitaevskii Equation, Quantum Many-Body Perturbation Theory for Bose-Einstein Condensates", Brett

McKinney, Deborah Watson.

Watson: "1/N Perturbation Theory - Insight into Atomic Systems and Bose-Einstein Condensates", Texas Tech Physics Department, April 13, 2000.

Cowan: “Stellar Heavy Element Abundances and Ages," invited talk, Nucleosynthesis 2000, American Chemical Society Meeting, Washington, DC (August 2000)

Visitors

Mike Edmunds from Cardiff University visited Dick Henry during September, during which they began work on emission spectra at high redshift. Mike also assumed the character of Isaac Newton during a dramatic portrayal presented as part of the Friday Night At The Observatory lecture series.

Michael Revzen, from Technion, visited Kim Milton, and they worked on Casimir effect, in May.

Al Cameron, Harvard, a frequent visitor to OU was here in September to work with John Cowan.

Eileen Friel, NSF Washington, visited in late September. Eileen is an astronomer interested in galactic chemical evolution, but has been serving as an attentive program director for several years.

Grants Awarded

NASA, Oct, 2000 -- Sept, 2001, “Multi-wavelength Studies of Supernovae”, E. Baron, D. Branch and P. H. Hauschildt (UGA), $50,000

David Branch received $43,000 from NSF for "Direct Analysis of Supernova Spectra".

Watson: Office of Naval Research ONR Deborah Watson P.I., "A Study of Bose-Einstein condensates Using Perturbation Theory", $450,000.

Cowan: National Science Foundation, “The Age, Formation, and Evolution of the Elements in the Oldest Galactic Stars," for $147,644.

Morrison: National Science Foundation: “Quantum Scattering Processes Involving Low-Energy Electrons," July 2000 -- July 2003.

Research Travel

Eddie Baron visited the University of Padova, where they were very eager to help him with his Supernova Spectrum Repository database project.

John Cowan visited University of Texas at Austin to work on Hubble Space Telescope projects on abundances in the oldest Galactic stars (June). He also traveled to the University of Chicago to work on research projects studying nucleosynthesis in supernovae (July).

Dick Henry made his usual summer trip to Williams College, to work with Karen Kwitter, in June.

Breakthroughs

The Khodaparast, Chung, Santos, and Doezema collaboration has observed the signature of "B=0" spin splitting brought about by spin-orbit coupling in a semiconductor quantum well. The B=0 splitting causes large shifts in the apparent g-factor determined from electron spin resonance in the far-infrared. This will result soon in a pretty nifty publication!

Bill Romanishin and collaborator Steve Tegler (Northern Arizona University) continue to study objects out near and past Pluto called Kuiper Belt Objects (KBOs). They have been to Hawaii three times in the past two years to (snorkel and) use the 10 meter Keck II telescope on Mauna Kea to observe these objects. They continue to use smaller telescopes in Arizona as well. Two years ago, they published a paper in Nature saying the KBOs come in two colors- gray and red. This result continues to perplex and confound planetary astronomers. With the new Keck data, they now find what they hope will be a clue to the origin of the colors of KBOs. The clue is that all the KBOs which lie in a flattened distribution past Pluto are red, while other KBOs are split between gray and red. A paper discussing this new work has been accepted for publication in Nature.

Romanishin and Tegler also published a paper on the sizes and shapes of KBOs in Nature. With the newly accepted paper, that makes three Nature papers on KBOs by these guys.

TEACHING NEWS

Morrison: First time at bat teaching undergraduate thermodynamics and statistical mechanics. I love it! My (lousy) undergraduate course at (don't tell anyone) Rice University left me cold on the subject. I didn't realize until about 4 years ago, when I stumbled into a hot research collaboration

which uses lots of stat mech, what a truly beautiful and powerful subject it is. I've been looking forward to teaching it ever since. I'm on the steep learning curve, and, as always, hoping to learn a lot from my students about how to effectively teach this marvelous material.

Bill Romanishin is in the process of writing an undergraduate textbook on astronomical photometry using CCDs. The current version of the book is available on the web (see the OU Observatory web page). Astronomers at several universities have adopted this for their classes.

Dick Henry began teaching a new course this year, Musical Acoustics. The class is an effort to reach students in the Fine Arts in particular with a Physics course which addresses a subject to which these students can easily relate. The course has a weekly lab component.

ALUMNI NEWS WANTED

It’s been a long time since I’ve heard news from anyone in alumniland. How about updating us on what you’re doing these days. How’s the work going? Any new discoveries, honors, awards, publications, promotions, degrees, children, mortgages paid off? Let’s hear from you, especially if you can’t make it to the Lin Symposium. It’s simple. Just type in henry@nhn.ou.edu and let me know everything!

Chun Lin Symposium

October 13 – 14, 2000