

Colorado State University Physics Department Newsletter

Issue 17

November 2008

From the Chair

Dear Physics Alumnus/Alumna and Friends of the Department:

The semester is in full swing and unfortunately the economic problems start to impact us. Nevertheless, there are still good things to report what is going on in the department.

We have started our High School Visitation program again and have planned for High School Visits in fall (Northridge High School in Greeley, September 30, and November 11, 2008, Thompson Valley High School in Loveland, October 14, 2008, and Mountain View High School in Loveland, October 28, 2008). This time Profs. Stuart Field and Miguel Mostafa have joined Profs. Jake Roberts and Marty Gelfand to give presentations. The presentation entitled "The Physics Soup" and the experimental demonstrations are very well received by teachers and students.

We also had our Start-of-the-semester Barbecue and an International Conference on Microwave Magnetics organized by Prof. Mingzhong Wu in honor of Prof. Carl Patton in September, and you can read more about it in this Newsletter.

I am also very happy to announce that Profs. Steve Lundeen, Miguel Mostafa, and Mingzhong Wu have received funding for their proposed research.

Congratulation Steve, Miguel, and Mingzhong !

Your support will help us to become the best Department we can be and to provide a better educational experience for our students. Please feel free to contact me at (970) 491-6246 or to email me at <u>dieter@lamar.colostate.edu</u>, if you would like to become more involved.

Yours sincerely,

Hans D. Hochheimer

Chair, Department of Physics

All issues of the Physics Department Newsletter can be found on the departmental Webpage (<u>http://www.physics.colostate.edu/</u>) by clicking on News on the upper right side.



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Andes in Chile

Publications:

Kevin R. Smith, Michael J. Kabatek, Pavol Krivosik, and Mingzhong Wu, "Spin wave propagation in spatially non -uniform magnetic fields", Journal of Applied Physics <u>104</u>, 043911 (2008).

Anthony R. Gorges, Nicholas S. Bingham, Michael K. DeAngelo, Mathew S. Hamilton, and Jacob L. Roberts, Light assisted collisional loss in an ^{85/87}Rb ultracold optical trap, Phys. Rev. A **78**, 033420 (2008).

J. Nilsen, J.I. Castor, C.A. Iglesias, K.T. Cheng, J. Dunn, W.R. Johnson, J. Filevich, M.A. Purvis, J. Grava, and J.J. Rocca, "Understanding the anomalous dispersion of doublyionized carbon plasmas near 47 nm", High Energy Density Physics <u>4</u>, 107, (2008).

S.-G. He, Y. Xie, F. Dong, S. Heinbuch, E. Jakubikova, **J.J. Rocca**, and E.R. Bernstein, *"Reactions of Sulfur Dioxide with Neutral Vanadium Oxide Clusters in the Gas Phase. I. Experimental Study Employing Single Photon Ionization", Journal of Physical Chemistry A Online October 10, 2008) DOI: 10.1021/jp805744g*

M. Purvis, J. Grava, J. Filevich, M.C. Marconi, J. Dunn, S.J. Moon, V.N. Shlyaptsev, E. Jankowska, and J.J. Rocca, "Soft x-ray laser interferometry of colliding laser-created plasmas in semi-cylindrical cavities", IEEE Transactions on Plasma Sciences <u>36</u>, 4, 1134, (2008).

J. Grava, M.A. Purvis, J. Filevich, M.C. Marconi, J. Dunn, S.J. Moon, V.N. Shlyaptsev, and **J.J. Rocca**, *"Soft X-Ray Laser Interferometry of a Dense Plasma Jet*", IEEE Transactions on Plasma Sciences <u>36</u>, 4, 1286, (2008).

J. Grava, M.A. Purvis, J. Filevich, M.C. Marconi, **J.J. Rocca**, J. Dunn, S.J. Moon, V.N. Shlyaptsev, *"Dynamics of a dense laboratory plasma jet investigated using soft xray laser interferometry"*, Physical Review E <u>78</u>, 016403, (2008).

Hoffmann, A., Sort, J., **Buchanan, K. S.**, and Nogués, J. *"Exchange-biased magnetic vortices " (invited).* IEEE Transactions on Magnetics <u>44</u>, 1968 (2008).

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Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration) "*First study of the radiation-amplitude zero in Wgamma production and limits on anomalous WWgamma couplings at sqrt(s)=1.96 TeV*", Phys Rev Lett. <u>100</u>, 241805 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Search for Large Extra Dimensions in the Mono-photon Final State at sqrt(s)=1.96 TeV", Phys Rev Lett.**101**, 011601 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Observation of the Bc meson in the exclusive decay Bc->JpsiPi", Phys Rev Lett.<u>101,</u> 012001 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "*Evidence for production of single top quarks*", Phys Rev D <u>78</u> 012005 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Measurement of the ratio of the pp(bar)->W+c-jet cross section to the inclusive pp(bar)->W+jets cross section", Phys Lett B <u>666</u>, 23 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Measurement of the inclusive jet cross section in pp (bar) collisions at sqrt(s)=1.96 TeV", Phys Rev Lett. **101**, 062001 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Search for Higgs bosons decaying to tau pairs in ppbar collisions with the D0 detector", Phys Review Lett. <u>101</u>, 071804 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Search for doublycharged Higgs boson in the H++H-- to m+m+m-m- final state at $D0^{\circ}$, Phys Rev Lett. <u>101</u>, 071803 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Measurement of the differential cross section for the production of an isolated photon with associated jet in ppbar collisions at sqrt(s)=1.96 TeV", Phys. Lett. B <u>666</u>, 435 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Search for longlived particles decaying into electron or photon pairs with the D0 detector", Phys Rev Lett. **101**, 111802 (2008)

Abazov V.M. et al. (Norm Buchanan,

D0 Collaboration), "Search for tt(bar) resonances in the lepton plus jets final state in pp(bar) collisions at sqrt(s) =1.96 TeV", Phys Lett B <u>668</u>, 98 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Search for scalar leptoquarks and T-odd quarks in the acoplanar jet topology using 2.5 fb-1 of ppbar collision data at sqrt(s)=1.96 TeV", Phys. Lett. B <u>668</u>, 357 (2008)

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "Search for decay of a fermiophobic Higgs boson h_f to gamma+gamma with the D0 detector at sqrt(s)=1.96 TeV", Phys. Rev. Lett. **101**, 051801 (2008).

Abazov V.M. et al. (**Norm Buchanan**, D0 Collaboration), "*ZZ->l*/+*l*/-*nunu* (*bar*) *in pp(bar*) *collisions at sqrt(s)* =1.96 TeV", Phys Rev D <u>78</u>, 072002 (2008)

Aad G. et al. (**Norm Buchanan**, AT-LAS Collaboration), "The ATLAS Experiment at the CERN Large Hadron Collider", JINST 3 S08003, (2008)

Norm J. Buchanan et al. "ATLAS liquid argon calorimeter front end electronics", JINST 3 P09003, (2008)

Presentations:

Prof. Miguel Mostafa gave a talk entitled "*Latest results from the Pierre Auger Observatory*" in the "Cosmic Rays, Neutrinos, & Astrophysics" session at Cosmo 08 meeting in Madison, Wisconsin, August 25- 29, 2008.

Cosmo is a leading forum where particle physicists, cosmologists and astrophysicists worldwide meet and exchange ideas in one of the most active areas in physics. The conference typically attracts more than two hundred researchers.

Prof. Miguel Mostafa gave an **invited** talk entitled "*Latest results from the Pierre Auger Observatory*" at the Joint Fall 2008 Meeting of the Texas and Four Corner Sections of APS, AAPT, and Zones 13 and 16 of SPS, and the Societies of Hispanic & Black Physicists, El Paso, Texas, October 17-18, 2008

Dr. Corneliu Nistor gave a presentation entitled *"Microwave-assisted magnetization reversal in Permalloy films* and submicron-scale structures" at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Zihui Wang gave a presentation entitled "Microwave-assisted magnetization reversal dynamics" at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Dr. Wei Tong gave a presentation entitled "*Random generation of black solitary waves from incoherent surface spin waves*" at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Dr. Young Yeal Song gave a presentation entitled *"In-plane c-axis oriented barium ferrite films grown on a-plane sapphire substrates with self bias low microwave loss"* at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Dr. Jaydip Das gave a presentation entitled *"Electric field tunable low loss YIG-BSTO heterostructures for microwave Applications"* at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Dr. César Leonardo Ordóñez Romero gave a presentation entitled *"Direct observation of three-magnon confluence process in backward volume waves traveling in thin YIG films"* at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Dr. Wei Tong gave a presentation entitled *"Excitation of chaotic backward volume spin waves through three-wave Interactions" at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008*

Dr. Sangita Kalarickal gave a presentation entitled *"Two magnon scattering in polycrystalline hipped YIG spheres"* at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Prof. Kristen Buchanan gave a presen-

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tation entitled "Nonlinear excitations of magnetic vortices in patterned thin films", at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Dr. Pavol Krivosik gave a presentation entitled "Determination of the spin wave relaxation rate in Permalloy films" at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Kevin R. Smith gave a presentation entitled "Spin wave manipulation techniques for advanced microwave signal processing" at the 2008 International Conference on Microwave Magnetics (ICMM2008), Fort Collins, Colorado, September 12-14, 2008

Galymzhan Koishiyev gave a presentation entitled "Effects of non-uniformities on thin-film module performance" at the Joint Fall 2008 Meeting of the Texas and Four Corner Sections of APS, AAPT, and Zones 13 and 16 of SPS, and the Societies of Hispanic & Black Physicists, El Paso, Texas, October 17-18, 2008. *He won an outstanding student presentation award for his talk.*

Kuo-Jui (Ray) Hsiao presented a poster entitled "Where can we make an efficiency breakthrough with CdTe solar cells?" at the Joint Fall 2008 Meeting of the Texas and Four Corner Sections of APS, AAPT, and Zones 13 and 16 of SPS, and the Societies of Hispanic & Black Physicists, El Paso, Texas, October 17-18, 2008

Daniel Ruterbories gave a presentation entitled "Quality Assurance Test Setup for MPPCs used by the P0D in the T2K Experiment" at the Joint Fall 2008 Meeting of the Texas and Four Corner Sections of APS, AAPT, and Zones 13 and 16 of SPS, and the Societies of Hispanic & Black Physicists, El Paso, Texas, October 17-18, 2008

M. Purvis, J. Grava, J. Filevich, J. J Rocca, J. Dunn, S. Moon, V. Shlyaptsev," *Collimation of laboratory plasma jets studied with soft x-ray laser interferometry*," 50th Annual Meeting of the Division of Plasma Physics, Dallas, Texas, November 17-21, (2008) M. Berrill, F. Brizuela, B. Langdon, H. Bravo, C. Menoni, **J.J. Rocca**, "Photoionized Plasmas Created by Soft X-Ray Laser Irradiation of Solid Targets," 50th Annual Meeting of the Division of Plasma Physics, Dallas, Texas, November 17-21, (2008)

J.J. Rocca, Y. Wang, F. Pedaci, M. Berrill, B. Luther, D. Alessi, D. Martz, B. Reagan, F. Furch, E. Granados, F. Brizuela, P. Wachulak, M. C. Marconi, C. S. Menoni, "*Phase-coherent Soft X-ray Lasers at Wavelengths down to 13.2nm*," Plenary talk. 30th European Conference on Laser Interaction with Matter, XXX ECLIM, Darmstadt, Germany, August 31 – September 5, (2008).

J. Dunn, S.J. Moon, J. Nilsen, M. Purvis, J. Filevich, J. Grava, M.C. Marconi, **J.J. Rocca**, and V.N. Shlyaptsev, "*X-ray Laser Interferometry of Confined Laser-Produced Plasmas,*" 11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

J.J. Rocca, Y. Wang, F. Pedaci, B. Luther, M. Berrill, F. Furch, B. Reagan, D. Alessi, V.N. Shlyaptsev, M.Man Shakya, S. Gilbertson, Z. Chang, M. Marconi, and C.S. Menoni, Invited talk. "High coherence injection-seeded table-top soft x-ray lasers at wavelengths down to 13.2 nm and other advances in compact soft x-ray lasers," 11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

C.S. Menoni, F. Brizuela, C. Brewer, Y. Wang, F. Pedaci, B. Luther, M.C. Marconi, **J.J. Rocca**, W. Chao, Y.W. Liu, E.H. Anderson, D.T. Attwood, A.V. Vinogradov, I.A. Artioukov, Y.P. Pershyn, and V.V. Kondratenko, Invited talk. *"Advances in Nanoscale resolution soft x -ray laser microscopy*, "11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

P.W. Wachulak, M.C. Marconi, R. Bartels, C.S. Menoni, and **J.J. Rocca**, "Soft X ray Holography with wavelength resolution," 11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

M. Berrill, F. Brizuela, B. Langdon, H. Bravo, C.S. Menoni, and **J.J. Rocca**, *"Warm Photoionized Plasmas Created by Soft X-Ray Laser Irradiation of Solid Targets*," 11th International Conference On X -Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

M.C. Marconi, P.W. Wachulak, C. Brewer, F. Brizuela, R. Bartels, C.S. Menoni, **J.J. Rocca**, E. Anderson, and W. Chao, *"Resolution and Feature Size Assessments in Soft X ray Microscopy Images,"* 11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

S. Heinbuch, F. Dong, E.R. Bernstein, and **J.J. Rocca**, "Gas-Phase Study of the reactivity of optical coating materials with hydrcarbons using a desk-top size capillary discharge soft x-ray laser," 11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

S. Heinbuch, F. Dong, E.R. Bernstein, and **J.J. Rocca**, "*Gas Phase of Catalytic processes involving VmOn clusters using a desk-top soft x-ray laser*," 11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

R.L. Sandberg, P.W. Wachulak, D.A. Raymondson, A. Paul, A.E. Sakdinawat, B. Amirbekian, E. Lee, Y. Liu, C. La-O-Vorakiat, C. Song, M.C. Marconi, C.S. Menoni, M.M. Murnane, **J.J. Rocca**, H.C. Kapteyn, and J. Miao, *"Lensless imaging using table-top soft x-ray lasers and hiugh harmonics sources reaching 70 nm resolution,"* 11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008).

P.W. Wachulak, M.C. Marconi, W. Rockward, D. Hill, E.H. Anderson, C.S. Menoni, and **J.J. Rocca**, *"Interferometric Lithography with a Desk Top size Soft X ray laser,*" 11th International Conference On X-Ray Lasers, Belfast, United Kingdom, August 17 – 22, (2008)

F. Brizuela, P.W. Wachulak, C.A. Brewer, C. S. Menoni, W.Chao, E.H. Anderson, R.A. Bartels, **J.J. Rocca**, and M.C. Marconi, "Simultaneous determination by correlation of feature size and spatial resolution in EUV images of patterned nanostructures," 9th International Conference on X-Ray Microscopy -XRM2008, Zürich, Switzerland, July 21 -25, (2008).

Other Events:

Dr. Pablo Bauleo has been invited to

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write a cosmic rays review for **Nature**. A first draft has already been submitted to the Auger internal publication committee.

Prof. Bruce Berger attended the Kam-LAND collaboration meeting at Tohoku University in Sendai, Japan, from September 12-15, 2008 and gave a presentation entitled "KAMFEE Report" - KAM-FEE is the name of the data-acquisition electronics used by KamLAND. It stands for KamLAND Front-End Electronics. Prof. Berger is responsible for maintaining and supporting these electronics.

Profs. Bruce Berger, Bob Wilson, Walter Toki, Dave Warner, and Dr. Norm Buchanan attended the T2K collaboration meeting at KEK in Tsukuba, Japan, from October 7-11, 2008. Prof. Bruce Berger gave a presentation entitled "* "POD MPPC QC Testing" - POD stands for Pi-Zero Detector. MPPC stands for Multi-Pixel Photon Counter, it is the name of the photosensors made by Hamamatsu that we will use in the POD. Many of the other T2K near detector subsystems also use MPPCs. QC stands for Quality Control. CSU is doing the quality-control testing for all 11,000 MPPCs that will be used in the P0D.

Dr. Norm Buchanan gave a presentation entitled "*PiZero Detector Installation Planning*".

Prof. Kristen Buchanan was on the technical committee for the 2008 International Conference on Microwave Magnetics, September 12-14, 2008 at Colorado State University.

Prof. Kristen Buchanan attended the Program Committee Meeting in July held in Washington DC for MMM 2008: 53rd Annual Conference on Magnetism and Magnetic Materials (the conference will be held Nov. 10-14, 2008 in Austin, TX)

Dr. Norm Buchanan gave C++ lectures in July/August for graduate students

Dr. Norm Buchanan gave in August a colloquium talk at the Physics Department of Colorado State University entitled "*Hadron Physics with Results from D0*"

Dr. Norm Buchanan went to NY (SUNY Stony Brook) for a ND280 collaboration meeting and to take a week of PiZero detector assembly shifts (Aug 15th-23rd)

Dr. Norm Buchanan was asked to serve as a member on the T2K technical board

The following students have passed their examination successfully:

Ph. D. Preliminary Exam

Kuo-Jui (Ray) Hsiao has passed his Ph. D. preliminary exam on October 28, 2008. He gave a presentation entitled *"How can we make an efficiency breakthrough with CdTe solar cells?"* (Advisor: Professor Jim Sites)

Galymzhan Koishiyev has passed his Ph. D. preliminary exam on October 29, 2008. He gave a presentation entitled "Effect of non-uniformities on thinfilm solar module performance" (Advisor: Professor Jim Sites)

Prof. James Sites was the keynote speaker in Uppsala, Sweden, at a oneday Nordic workshop on numerical simulations of CIGS solar cells. About 40 participants came on October 16 from Sweden, Norway, Finnland, Estonia, Russia, and Poland.

The following day, Prof. Sites served as the outside committee member, referred to as the "opponent", for an Uppsala student's PhD defense. Following tradition, the student Ulf had previously nailed his thesis to an ancient board in the departmental office. Before guizzing the student. Sites had the job of introducing the topic with instructions to make it clear to his parents and other family members. At the end of the exam, the student's friends descended on him. accused him of using his thesis devices as antennas to transmit secret information to the Russians, and showed incriminating pictures they had manufactured of him meeting with various unsavory characters. Worse still, the pictures were dated the same days he claimed he was taking the data for his thesis. In spite of all this, his committee passed him unanimously.

Neutrino News:

This past October saw the largest CSU contingent yet to visit the Japanese High Energy Physics Laboratory (KEK) for the

Tokai-to-Kamioka (T2K) neutrino oscillation experiment collaboration. **Profs. Bruce Berger, Walter Toki, and Bob Wilson** along with project engineer **Dave Warner** and Research Scientist

Dr. Norm Buchanan reported on the many CSU contributions to the design and construction of the 15-tonne Pi-Zero Detector (P0D), which is part of the T2K "Near Detector".

As the chief engineer and project manager for the US part of the project, Warner was in perpetual discussion with physicists and engineers from the UK, Canada, and Japan as he attempted to ensure that our equipment would fit with everyone else's components. Buchanan recently accepted the important task of overseeing the installation of the P0D at the new JPARC accelerator complex about 30 miles north of KEK. This was his first trip to Japan which was capped by a visit to JPARC so he could see first hand the deep "pit" that is to be the final resting place for the P0D by summer 2009.

Left behind at CSU to keep construction and testing going were graduate students Shamil Assylbekov, Jung Doo Lee and Dan Ruterbories along with several members of the technical staff including new hire Jackie Schwehr, a recent graduate of University of California at Berkeley. Between them they have characterized hundreds of near-UV LEDs for the P0D Light Injection System and more than a third of the 11,000 silicon photosensors required for the experiment.

In early September Prof. Bob Wilson attended the International Workshop on Next Generation Nucleon Decay and Neutrino Detectors (NNN08) in Paris, France. This series of workshops rotates annually through the US, Europe and Asia and as a member of the advisory committee for the proposed 600,000 ton Underground Nucleon Decay and Neutrino Observatory (UNO) water Cherenkov detector, Bob has been a frequent participant culminating in an invitation to host the 10th anniversary of the workshop in Colorado next fall. In fact, you can help with our preparations: below are four drafts for the workshop poster send a vote for your favorite to Kathy Reischau

(reischau@lamar.colostae.edu).

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NNN09 - Colorado Workshop on Next Generation Nucleon Decay and Neutrino Detectors Fall 2009



International Meetings:

The 2008 International Conference on Microwave Magnetics took place on September 12-14, 2008 at Colorado State University. This conference brought together scientists and engineers interested in new developments in all branches of fundamental and applied microwave magnetics. Emphasis was on experimental and theoretical research in magnetization dynamics and relaxation. high frequency and microwave materials, microwave and millimeter wave devices, and nonlinear waves and solitons. The program consisted of both plenary sessions and parallel sessions. The conference was in honor of

Professor Carl E. Patton, in recognition of his contributions to the field of high frequency and microwave magnetics. The conference was held over the weekend of his 67th birthday. For more information on this conference, please visit the conference website at www.icmm2008.com.

Scholarship Awards

The following undergraduate students have received scholarships

Jeremy May, the Weber Scholarship

Nick Lewkow, the Sites/Regelson Scholarship

Andrew Davis, the Winder Scholarship

Caley Buxton and Kristen Voigt, the Alumni Scholarships

Liam Kilcommons and Erin Massey, the First-Year Physics Scholarships

Congratulation to Jeremy, Nick, Andrew, Caley, Kristen, Liam and Erin.

2008 Galeener Lecture

Dr. Eric Cornell, Winner of the 2001 Nobel Prize for Physics, Senior Scientist, National Institute of Standards and Technology, University of Colorado at Boulder gave a colloquium entitled "*Can we measure the electron's out-ofroundness to 10*¹⁵ *femtometers?*" on Thursday, October 9, 2008

Note this is no typo: 10⁽⁻¹⁵⁾ femtometers is about a millionth of a billionth of the size of a proton!

In the evening he then presented the Department of Physics 2008 Galeener Memorial Lecture at the Edna Rizley Griffin Concert Hall, University Center for the Arts entitled "Stone Cold Science: Bose-Einstein Condensation and the Weird World of Physics a Millionth of a Degree Above Absolute Zero"

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Funding

Prof. Miguel Mostafa's proposal "Study of the Highest Energy Cosmic Rays with the Pierre Auger Observatory" has been funded by the National Science Foundation

Prof. Mingzhong Wu's proposal "Instrumentation for research and education on millimeter wave materials and devices" has been funded by the US Army Research Office

Prof. Steve Lundeen's proposal "Properties of actinide ions from measurements of Rydberg ion fine structure" has been funded by the Department of Energy.

CSU Physics hosts Nobel Prize winner, Eric Cornell

Eric Cornell, co-winner of the 2001 Nobel Prize for discovering Bose Einstein Condensation, visited CSU on October 9 to deliver the Galeener Lecture. The Galeener Lectures honor Frank Galeener, a former CSU physics faculty who died in 1993 and was memorialized in this lecture series by the generosity of friends and colleagues. Cornell's evening lecture, titled "Stone Cold Science: Bose-Einstein Condensation and the weird world of physics a millionth of a degree above absolute zero", was attended by about 200 students, faculty, and community members. He described his cutting edge science with everyday language and a liberal dose of humor. The enthusiastic audience response demonstrated the success of his presentation. Faculty member Bob Leisure, who has attended all the previous Galeener Lectures, remarked afterward that he felt it had been the best one yet. A reception after the lecture provided an opportunity for audience members to visit with Dr. Cornell directly.

Dr. Cornell spent the entire day at CSU, visiting with faculty and students. He set aside a special time to visit with our undergraduate majors in the SPS study room, and another time to visit with our graduate students. Both groups seemed to really enjoy the opportunity to visit informally with such a remarkable scientist.

Late in the afternoon, Cornell gave a special physics colloquium describing his new research effort aimed at discovering, or at least improving the

Frank L. Galeener memorial lecture

October 9 • 7:30 pm • Edna Rizley Griffin Concert Hall 1400 Remington St., Fort Collins, CO Reception immediately following

Stone Cold Science: ULTRACOLD ATOMS

Bose-Einstein Condensation and the Weird World of Physics a Millionth of a Degree Above Absolute Zero



DR. ERIC CORNELL Winner of the 2001 Nobel Prize for Physics and Senior Scientist Natio

Physics and Senior Scientist, National Institute of Standards and Technology University of Colorado at Boulder

Colorado State University

experimental limits, on the electron's electric dipole moment. This ambitious project, if successful, could well earn him a second Nobel Prize. However, as his presentation made clear, many experimental challenges still remain to be overcome.

Prior to the evening lecture,

Prof. Jake Roberts hosted three groups of Colorado high school students and their teachers for a "Cold Atom Tutorial". Roberts, who played an important role as a graduate student in the BEC experiments described later by Cornell, introduced many of the experimental techniques used in laser cooling of atoms, and hosted a tour of his own laboratory

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here at CSU where ultra-cold atoms are an everyday occurrence. Many of these students remarked later how helpful this tutorial had been in helping them to appreciate the results presented in the evening lecture.





Prof. Eric Cornell (left) meeting with Janet Galeener (3rd from left) after the lecture. Also in the picture (left to right: Minnie Krueger, Prof. David Krueger and the wife of Frank's son Matthew)



 $\mathsf{Prof.}$ Eric Cornell Cornell visiting with group of high school students from Wheat Ridge High school after the talk .

Prof. Eric Cornell at a meeting with our undergraduate students in the SPS lounge. (Prof. Cornell second from right)

High School Students Attend Tutorial, Galeener Lecture

As part of the activities surrounding the Galeener Lecture, three groups of high school students came to campus and participated in a tutorial presented by Prof. Jacob Roberts and then attended the public lecture given by Nobel Laureate Dr. Eric Cornell. The tutorial gave the students a chance to learn more about the physics that underlies ultracold science, with the hope that they would then be able to relate better to the material presented in Dr. Cornell's talk. While it wasn't really possible to fully describe over one hundred years of physics in an hour and a half, the high school students enjoyed the tutorial and the talk, and said that the tutorial did help them understand the lecture.

During the tutorial topics such as particlewave duality, quantum statistics, the Heisenberg Uncertainty principle, quantized motion, photons, the ability of light to carry momentum, what temperature means for quantum gases, and how laser cooling works were presented. The students and teachers asked wide-ranging questions during the tutorial over pizza and soft drinks, and then had a chance to see laser-cooled ultracold atoms in Dr. Roberts's research lab.

A total of about 20 students and three teachers participated. The high schools represented were Bear Creek High School in Lakewood, the Contemporary Learning Academy in Denver, and Wheat Ridge High School in Wheat Ridge. All of the students who attended were taking high school physics.



Owl



Prof. Jake Roberts and high school students in his lab.



High School students enjoying Prof. Roberts lecture in his lab

International Conference on Microwave Magnetics ICMM 2008





International Conference on Microwave Magnetics September 12-14, 2008 Fort Collins, Colorado, USA

The first International Conference on Microwave Magnetics (ICMM) was held on September 12-14, 2008 at Colorado State University (CSU). The conference was held in honor of Professor Carl Patton, in recognition of his contributions to the field of high frequency and microwave magnetics. This international conference brought together professors, students, scientists and engineers from about 50 universities and research laboratories all over the world. While members of the conference committees hailed from various universities, research laboratories and the industry, the members from the CSU Physics department were (in alphabetical order) Prof. Kristen Buchanan, Dr. Pavol Krivosik, Dr. Young Song and Prof. Mingzhong Wu.

The conference focused on new developments in all branches of fundamental and applied microwave magnetics. Emphasis was on experimental and theoretical research in magnetization dynamics and relaxation, high frequency and microwave materials, microwave and millimeter wave devices, and nonlinear waves and solitons. The program consisted of over sixty five presentations in both plenary and parallel sessions. Attendees also included several Maglab alumni and previous CSU students/post-doctoral research fellows. Presentations from the CSU Physics Department were as follows (in alphabetical order):

Kristen Buchanan

"Nonlinear excitations of magnetic vortices in patterned films"

Jaydip Das

"Electric field tunable low loss YIG-BSTO heterostructures for microwave applications"

Sangita Kalarickal

"Two magnon scattering in polycrystalline hipped YIG spheres"

Pavol Krivosik

"Determination of the spin wave relaxation rate in Permalloy films"

Corneliu Nistor

"Microwave-assisted magnetization reversal in Permalloy films and submicron-scale structures"

César Leonardo Ordóñez-Romero

"Direct observation of three-magnon confluence process in backward volume waves traveling in thin YIG films"

Kevin R. Smith

"Spin wave manipulation techniques for advanced microwave signal processing"

Young Yeal Song

"In-plane c-axis oriented barium ferrite films grown on a-plane sapphire substrates with self bias low microwave loss"

Wei Tong

"Random generation of black and bright solitary waves from incoherent surface spin waves"

Wei Tong

"Excitation of chaotic backward volume spin waves through three-wave interactions"

Zihui Wang

"Microwave-assisted magnetization reversal dynamics"

Along with technical presentations, there were also various social events and accompanying programs. On September 13, Jeanne Patton organized "Best of Fort Collins" tour. On September 15 the conference attendees had a chance to enjoy a beautiful day in the Rocky Mountain National Park.

The conference sponsors were (in alphabetical order):

Agilent Technologies, CSU College of Natural Sciences, CSU Physics Department, CSU Office of International Programs, IEEE Magnetics Society, Lakeshore Cryotronics, Inc., National Institute of Standards and Technology, Boulder, Renaissance Electronics Corporation

More information about the ICMM 2008 Conference can be found at http:// www.icmm2008.com.

International Conference on Microwave Magnetics ICMM 2008 (continued)



Start-of-the-Semester Barbecue

On Friday, September 5, 2008 we had our annual Start-of-the-Semester Barbecue, also known as Fall Cookout. Though it was quite cool and the "sword of rain" was dangling over us, it turned out to be a great event with at least 100 participants (undergraduate and graduate students, staff, and faculty with family and friends). In particular, it seems that the brats were a big success.

We could hardly grill them fast enough as they were eaten and sometimes we had quite some lines at the grills. Left to right: Prof. Marty Gelfand (Grillmaster), Angus Day, Logan Muñoz, Yiyan Sun, Matt Vogel, Prof. Hochheimer (Griller)



The Grillmasters Prof. Gelfand and Bob Adame (Machine Shop Manager)



Our young faculty: Prof. Bruce Berger

Prof. Jake Roberts and his son, Tim





Waiting to be fed. Pay attention to the last person in the row (Leif Anderson). He will show up close to the grill on many pictures. The fact that he is so slim is misleading.



Start-of-the-Semester Barbecue (continued)



Left to right: Prof. Miguel Mostafa 's mother in law, Prof. Miguel Mostafa, Clarisa Mostafa holding Prof. Robert's daughter, Emily, Kathy Reischauer



Left to right; Marilyn Heller, unknown, Bonnie Gilmore, Prof. Phil Kearney, Prof. Mingzhong Wu, Logan Muñoz, Jeanine Leisure



Undergraduate students with Prof. Emeritus Phil Kearney (best Chili cook)

Prof. Bill Fairbank talking with graduate students Lei Lu and Zhengliang Zhang, right: Prof. Carl Patton



Prof. Emeritus Marvin Heller

Left to right: David Thomas, Prof. Bob Wilson, Dr. Barbara Wilson, Michael Gussert, Lily Thomas, Becka Thomas



Visits at Northridge High School in Greeley and Thompson Valley High School in Loveland



Graduate students Kuo Liu Hsiao (left) and Yiyan Sun

Visits at Northridge High School in Greeley and Thompson Valley High School in Loveland

As mentioned before we have continued our High School Visitation program this

fall semester and will visit three high schools, Northridge High School in Greeley on September 30 and November 11, 2008, Thompson Valley High School in Loveland, October 14, 2008, and Mountain View High School in Loveland,

October 28, 2008.

Profs. Miguel Mostafa and Stuart Field have joined Profs. Jake Roberts, Marty Gelfand to give presentations about our Physics program at Colorado State University.

Comments from teachers:

Thank you so much for your visit to our classes yesterday. I very much appreciate your taking that much time out to share your experience and wisdom with my students. They will remember this well, I feel. I appreciate having that outreach. You have inspired me to renew my effort to keep up with developments in physics as best I can, to be able to keep students aware of the amazing opportunities out there in the field. Thank you for emphasizing that the hard work comes before the rewards are reaped. And, this will sink in better for them coming from you rather than me (A prophet is ...)

Thank you so much for coming to my physics classes this morning. Personally I liked the message you gave that it is important to work hard to achieve goals and that the "fun" and satisfaction come as part of that hard work. That was a message my students needed to hear!

Northridge High School in Greeley

Left to right; Physics teacher, Mr. Wheeler,



Prof. Jake Roberts presents his talk

Visits at Northridge High School in Greeley and Thompson Valley High School in Loveland (continued)



Students listening to the presentation

Thompson Valley High School in Loveland



Unloading our van. Left to right: Prof. Miguel Mostafa, Physics teacher, Allen Kenyon, Prof. Stuart Field



Prof. Miguel Mostafa presents his talk



Physics teacher, Allen Kenyon, discussing demonstrations with his students





Airbus 380

Student participating in a demonstration of the conservation of angular momentum

Contributions from Undergraduate student Scholarship recipients

Liam Kilcommons, First-Year Physics Scholarship



I am new to the physics department, but not completely new to scientific fields of study. My first two years of college were spent at Lewis and Clark College in Portland, Oregon studying chemistry. After my sophomore year at Lewis and Clark, I worked with physical chemist Dr. Nikolaus Loening on NMR spectroscopy research. Our project was related to accurately measuring the temperature of a sample by introducing a molecule with a temperature sensitive NMR spectrum. Following a year long hiatus, I began again as a physics major here at CSU. This summer, I was fortunate enough to be able to do research on microwave magnetics with Dr. Carl Patton, which I hope to continue later this year. Outside of school, I spend most of my time on martial arts, which has been a hobby of mine since high school.

Caley Buxton, Alumni Scholarship

I did not come to Colorado State University intending to be a physics major, but I could not be more grateful for the fact that I found myself in such an outstanding physics department. I enjoyed physics immensely in high school, due in large part to my teacher, whose enthusiasm for teaching, physics, and life was contagious. However, selecting a major



was very difficult for me, because I have always loved school and learning about a variety of subjects. Physics has turned out to be a wonderful fit for me. It allows me to constantly face new challenges and learn about such fascinating topics as relativity and quantum mechanics while incorporating my other interests. I am a religious study minor; I find it interesting and gratifying to look at the universe from both a scientific and religious perspective. I especially enjoy learning about physics concentrations such as high energy and particle astrophysics which offer insight into how the universe was created and is progressing. In the future, I hope to do research concerning some aspect of astrophysics and write about physics progression and discoveries. I am truly filled with joy and wonder when I see the role physics plays in everyday life. I hope that I can share my fulfillment with people who might otherwise be intimidated by the subject of physics by writing for a wide variety of audiences. I am very appreciative of my professors for their fervor and willingness to pass on their knowledge, and I am thankful that, by receiving this scholarship, I may continue my education and further enrich my life.

At the Four Corners Section Annual Meeting at the University of Texas in El Paso

Faculty and graduate and undergraduate students attended the 2008 Texas & Four Corners Sections American Physical Society joint meeting October 17-18, 2008 at the University of Texas in El Paso and presented talks and posters.

Left to right: Prof. Bill Fairbank, Chair of the 4 Corners Section, Kuo-Jui (Ray) Hsiao, Dan Ruterbories, Kendy Hall, Prof. Hans D. Hochheimer, Galymzhan Koishiyev; Left to right sitting: Mitch Knaub, Herbie Grotewohl, Aaron Hagerstrom

Our students gave very good talks talks and displayed excellent posters and graduate student, Galymzhan Koishiyev, won an outstanding student presentation award, which is quite an achievement. There were about 190 presentations and 35 posters and only 24 prizes have been awarded





Mitch Knaub explaining his research to the poster judge

At the Four Corners Section Annual Meeting at the University of Texas in El Paso (continued)



Daniel Ruterbories presents his talk



Kendy Hall presents his talk



Prof. Miguel Mostafa presents his invited talk.



Tired after marathon sessions, but still doing homework; left to rright: Herbie Grotewohl, Mitch Knaub, Kendy Hall



Our award winner, Galymzhan Koishiyev (right)