



PHYSICS DEPARTMENT NEWSLETTER

(<http://physics.montana.edu>)

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PHYSICS NEWSLETTER

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GENERAL NEWS

Montana State University's application for membership in the Association of Universities for Research in Astronomy (AURA) has been approved! MSU will join 31 other U.S. universities, and 7 international affiliates, as a member of AURA. AURA operates the National Optical Astronomical Observatories, the National Solar Observatory, and the Space Telescope Science Institute.

SPS PNNL/LIGO VISIT

The Society of Physics Students (SPS) had a great trip to Pacific Northwest National Labs (PNNL) and the Laser Interferometer Gravitational-wave Observatory (LIGO) in Richland and Hanford, Washington, respectively. We'd like to thank Dr. Smith for coordinating the visit to PNNL, thank those who attended, and thank the department for generously helping out with the monetary expenses of the trip. Anyone interested in learning more about the trip can email pckujawa@montana.edu. Six Physics majors, 3 graduate students, and 3 department staff members visited LIGO and PNNL in Richland WA on April 22nd. Some of them are beginning to believe in gravitational waves - very slowly. Many of them were impressed by the sophistication of the equipment and the engineering challenges associated with these two extremes of measurements, from the cosmos (LIGO) to atomic structure (STM). Yet, the two facilities both deal with the very small, in that LIGO measures displacements of 10^{-18} m(!) while STM instruments merely measure displacements of 10^{-12} m. All of the participants agreed that this trip was worth the 17 hours round-trip drive, and that it should become an annual event for students of the department. There are pictures posted on the SPS site: www.physics.montana.edu/sps/ligo. To be notified about future trips, join SPS! It's free, and you'll receive all the emails you could ever want about SPS events.



GENERAL NEWS (cont).

The Solar Physics group's home page has logged one million hits since January 1st of this year – peanuts compared to some of the NASA science sites, but noteworthy by our standards!

<http://solar.physics.montana.edu/>

John Getty and Michael Poser have constructed an "Interferometer Trombone" for incorporation in the MSU portion of the "Cosmic Questions" exhibit at the Museum of the Rockies. The acoustic interferometer will demonstrate the concept of interference as it will be used by the NASA/ESA Laser Interferometer Space Antenna (LISA).

Rufus Cone is serving on two prize committees for international conferences, the ICL 2005 PRIZE at the 14th International Conference on Luminescence 2005 in Beijing, China, July 25-29, 2005, and the inaugural Michael D. Sturge Prize at the 15th International Conference on Dynamical Processes in Exited States of Solids, in Shanghai, China, Aug. 1-5, 2005.

AWARDS, HONORS and NEW POSITIONS

Joey Shapiro, graduate student of Neil Cornish, has won the Jocelyn Bell Award for best student talk at the Pacific Coast Gravity Meeting, joining other recent MSU winners, Louis Rubbo in 2004 and Dan Bambeck in 2002.

Jason Scott, Physics major graduating in December 2004, has been selected to receive the "2005 Dean's Award for Excellence as the Outstanding Graduating Senior in Sciences"!

Keith Gilmore, graduate student in the Idzerda group, has been selected to attend the 2005 meeting of Nobel Laureates in Lindau, Germany this June.

Neil Cornish has been selected to receive this year's Wiley Award for Meritorious Research and Creativity.

Greg Francis has been selected to receive this year's James and Mary Ross Provost's Award for Excellence.

Yves Idzerda has been selected to receive this year's College of Letters and Science Dean's Award for Meritorious Research.

Dave Klumpar has been selected to receive the Provost's Award for Undergraduate Research/Creativity Mentoring for 2005!

Rose Waldon has been selected to receive the College of Letters and Science Employee Excellence Award for 2005!

Congratulations to all!



PH.D. THESIS DEFENSE

"The Solar Extreme-Ultraviolet Corona: Resolved Loops and the Unresolved Active Region Corona", Jonathan Cirtain, March 24.

MASTER'S THESIS DEFENSE

"Search for Point-Like Sources of Cosmic Rays with Energies Above $10^{18.5}$ eV in the Hires-I Monocular Dataset", Malina Kirn, Apr. 1.

ORAL COMPONENT OF PH.D. COMPREHENSIVE EXAM

"Cooper Pairs", Andrew Liebmann, Mar. 30.

"Using Magnetic Resonance Force Microscopy to Detect Spins", Hongyan Li, Mar. 31.

"Gravitational Lensing", Tyson Littenberg, Apr. 14

"Stellar Wind/Interstellar Medium Interaction", Silvina Guidoni, Apr. 21.

"The Golden Double Pulsar", Joey Shapiro, Apr. 22.

"Phonons", Vincent Corbin, Apr. 25.

PUBLICATIONS SUBMITTED

"Misfit dislocations at the single crystal Fe₂O₃/Al₂O₃ interface", S. Maheswaran, S. Thevuthasan, F. Gao, V. Shutthanandan, C. Wang and R.J. Smith, submitted to Physical Review B.

PUBLICATIONS ACCEPTED

"Atomistic modeling of Ag deposition on the low index faces of Al and Al deposition on Ag", Guillermo Bozzolo, Jorge E. Garcés, and Richard J. Smith, Surface Science (Accepted, March 2005)

"Temperature- and electric-field-dependent domain structures and phase transformations in (001)-cut tetragonal Pb(Mg_{1/3}Nb_{2/3})_{1-x}Ti_xO₃ (x=0.40) single crystal", R. R. Chien, V. H. Schmidt, L.-W. Hung, and C.-S. Tu, Journal of Applied Physics, to appear in May issue (2005)

"Recovery of spectral features readout with frequency chirped laser fields," T. Chang, M. Tian, R. K. Mohan, C. Renner, K. D. Merkel, and W. R. Babbitt, accepted for publication in Optics Letters

"Photonic Chirp Compression and Arbitrary Waveform Generation for Micro- and Millimeter-Wave Applications", Christoffer J. Renner, Tiejun Chang, Randy R. Reibel, Mingzhen Tian, W. Randall Babbitt, accepted for talk CLEO2005

"A new method for analyzing second-order phase transitions applied to the ferromagnetic transition of a polaronic system", J. A. Souza, Y.-K. Yu, J. J. Neumeier, H. Terashita, and R. F. Jardim, accepted for publication in Physical Review Letters.

PUBLICATIONS

"Bulk magnetic properties of La_{1-x}CaxMnO₃ (0<=x<=0.14): signatures of local ferromagnetic order", Hiroto Terashita and J. J. Neumeier, Phys. Rev. B 71, 134402 (2005).

"XAS Characterization of Growth Parameter Effects for Pulsed Laser Deposited Co_xTi_{1-x}O₂ Films", A. Lussier, J. Dvorak, Y. U. Idzerda, S. R. Shinde, S. B. Ogale, and T. Venkatesan, Physica Scripta Vol. T115, p. 623, 2005

"Surface analysis of pulsed-laser deposited V₂O₅ thin films and their lithium intercalated products studied by Raman Spectroscopy", C.V. Ramana, R.J. Smith, O.M. Hussain, M. Massot, and C. M. Julien, Surface and Interface Analysis **37**, 406-411 (2005).

"Electric-field effects of dielectric and optical properties in Pb(Mg_{1/3}Nb_{2/3})_{0.65}Ti_{0.35}O₃ crystal", C.-S. Tu, F.-T. Wang, R. R. Chien, V. H. Schmidt, and G. F. Tuthill, Journal of Applied Physics 97, 064112 (2005).

"Normalized differential detection by use of smart pixels with smart Illumination" Daryn E. Benson, Jim M. Murray, Robert D. Register III, Kevin S. Repasky, W. Randall Babbitt, Applied Optics, Vol. 44 Issue 13 Page 2607 (May 2005)

"XAS Characterization of Growth Parameter Effects for Pulsed Laser Deposited Co_xTi_{1-x}O₂ Films", A. Lussier, J. Dvorak, Y. U. Idzerda, S. R. Shinde, S. B. Ogale, T. Venkatesan, Physica Scripta **T115**, 623, (2005)

"Bulk magnetic properties of $La_{1-x}Ca_xMnO_3$ ($0 \leq x \leq 0.14$): signatures of local ferromagnetic order", Hirotoishi Terashita and J. J. Neumeier, Phys. Rev. B 71 (2005) 134402.

PROPOSALS FUNDED

HiTec grant for collaborative work with PNNL to fabricate and study solid oxide fuel cell materials and hydrogen separation ceramic membrane materials, DOE, \$174,233 (3rd yr supplement), Hugo Schmidt.

"Ultrafast studies of novel functionalized organic multiphoton absorbers", AFOSR DURIP, \$474,500. Aleksander Rebane and Charles Spangler. This equipment grant is for acquisition of a new state-of-the-art femtosecond laser system in Rebane group.

"Quantum computing using thulium doped spectral hole burning crystals"
ARO/DEPSCOR FY05 PI: Mingzhen Tian, co-PI W. R. Babbitt, 3 years, Budget: \$585,000.

"Fluxon Modeling of CME Onset," NASA OSS Targeted Research & Technology program, \$382,000 total. PI Craig DeForest (of SouthWest Research Institute), co-I Charles Kankelborg.

"Montana Space Grant Consortium", NASA, PI Bill Hiscock, 5 years, \$ 1,935,625.

INVITED TALKS

"Set the Controls for the Heart of the Sun", Charles Kankelborg, Southwest Montana Astronomical Society meeting, Museum of the Rockies, Mar. 25.

"Exploring Mars, past, present, and future", Bill Hiscock, keynote talk, Carroll College Astronomy Days, Helena, MT, April 9.

"Relativity in the Physics Curriculum: Where, When, and What?", Bill Hiscock, Special "World Year of Physics" session on teaching Special and General Relativity, April APS meeting, Tampa, Florida, April 16.

"Restraining the Laws of Nature with a Layer of Atoms", Dick Smith, Idaho State University and the Idaho Accelerator Laboratory in Pocatello, ID on Apr. 18.

"Negative thermal expansion of MgB₂ below T_c - possible violation of the Ehrenfest relation", John Neumeier, Workshop on Novel Electronic Materials, University of Kentucky, Apr. 27.

CONTRIBUTED TALKS

"Conductive PEDOT/PSS electrodes for the piezoelectric polymer PVDF", Joseph Polasik, Laura Lediaev, and V. Hugo Schmidt, SPIE Smart Structures/NDE Symposium, San Diego, March 7-10, 2005

"High temperature oxidation studies of filtered arc deposited CrAlN nanolayered coatings on steel plates", A. Kayani, C.V. Ramana, R.J. Smith, V.I. Gorokhovskiy, V. Shutthanandan, APS meeting, March 21-25, in Los Angeles, CA.

"Structure and thermal stability of thin Fe films grown on Al(001) surfaces with Ti as an interface stabilizer", R.J. Smith, G. Bozzolo, C. V. Ramana, and B.S. Choi, APS meeting, March 21-25, in Los Angeles, CA.

"Electric-field poling effect on thermal stability of monoclinic phase in a (110)-oriented Pb(Mg_{1/3}Nb_{2/3})_{0.74}Ti_{0.26}O₃ crystal", V. Hugo Schmidt, R. R. Chien, C.-L. Tsai, Chi-Shun Tu, and F.-T.

Wang, 2005 March Meeting of the American Physical Society, Los Angeles, CA, March 21-25, 2005.

"Energies of $4f^N$ and $4f^{N-1}5d$ States Relative to Host Bands in Rare-earth-doped Fluorides", C. W. Thiel, A. Collombet, R. L. Cone, M.-F. Joubert, A. Tkachuk, March Meeting of the American Physical Society, Los Angeles, CA, March 21-25, 2005.

"Photon Echo Measurement of Optical Decoherence in Er^{3+} -doped Silicate Fiber", R. M. Macfarlane, Y. Sun, P. B. Sellin and R. L. Cone, March Meeting of the American Physical Society, Los Angeles, CA, March 21-25, 2005.

"Anomalous transport in $Ca_{1-y}Sr_yMnO_3$ ($0 \leq y \leq 0.75$)", C. Chiorescu, J. L. Cohn, and J. J. Neumeier, Bull. Amer. Phys. Soc. 50, 997 (2005), APS March Meeting in Los Angeles.

"Negative thermal expansion of MgB_2 below T_c – violation of the Ehrenfest relation", J. J. Neumeier, T. Tomita, J. S. Schilling, A. Serquis, V. F. Nesterenko, and S. S. Indrakanti, Bull. Amer. Phys. Soc. 50, 1240 (2005), APS March Meeting in Los Angeles.

"The relationship between local structure changes and magnetization as a function of hole concentration in doped perovskite manganites", L. M. Downard, F. Bridges, S. Bushart, D. Larson, C. Downs, T. A. O'Brien, and J. J. Neumeier, Bull. Amer. Phys. Soc. 50, 913 (2005), APS March Meeting in Los Angeles.

"A new method for analyzing second-order phase transitions applied to the ferromagnetic transition of a polaronic system", J. J. Neumeier, Y.-K. Yu, J. A. Souza, H. Terashita, and R. F. Jardim, Bull. Amer. Phys. Soc. 50, 453 (2005), APS March Meeting in Los Angeles.

"Optical Homogeneous Linewidths and Spectral Diffusion at 1.5 microns in Mixed $Er^{3+}:Eu^{3+}:Y_2SiO_5$ Studied by Photon Echo", R. L. Cone, T. Böttger, C. W. Thiel, and Y. Sun, March Meeting of the American Physical Society, Los Angeles, CA, March 21-25, 2005.

"From Magnetite to Spintronics", A. Lussier, J. Dvorak, Y. U. Idzerda, S. Shinde, S. Ogale, and T. Venkatesan. April 10, 2005 Montana Academy of Sciences Annual Meeting in Butte, MT.

POSTER PRESENTATIONS

"Modeling PVDF actuators with conducting polymer electrodes", Laura Lediaev and Hugo Schmidt, SPIE Smart Structures/NDE Symposium, San Diego, March 7-10, 2005.

COLLOQUIA

"Biology Envy: Case Studies: Bacterial Magnets; Bacteria: can we listen to them? Dial A Disease: Boolean Theory of Disease; Bacterial Economics: The Real Economics; Global Forming: Putting Feedback Systems Back In Place", David Sands, MSU Plant Pathology, Bozeman, Mar. 11.

"The Sun on Fire: from Microflares to Coronal Mass Ejections", Jiong Qiu, Big Bear Solar Observatory, NJIT, Candidate for faculty position in Observational Solar Physics, Mar. 29.

"The magnetic structure of coronal loops", Dr. Marcelo Lopez-Fuentes, US Naval Research Laboratory, Apr. 1.

"The physical relationship between microwave and hard X-ray bursts during solar flares", Dr. Jeongwoo Lee, Center for Solar-terrestrial Research, JNIT, Apr. 5.

"Measuring the Zonal Winds on Titan: The Huygens Probe Doppler Wind Experiment", Dr. David H. Atkinson, Department of Electrical and Computer Engineering, University of Idaho, Apr. 8.

“WHAT IS LIFE”, Eric D. Schneider , Hawkwood Institute, Livingston, Montana, Apr. 22.

“Instabilities and Pattern Formation in Thin Polymer Films”, John R. Dutcher, Department of Physics, Centre for Food & Soft Materials Science and Advanced Foods and Materials Network, University of Guelph, Ontario, Canada, Apr. 29.

SEMINARS

Condensed Matter

"Magnetism at the Frontier", Damon Resnick, Mar. 7.

“EPR and ENDOR of axial and low-symmetry centers of Nd³⁺ in congruent and stoichiometric lithium niobate crystals”, Mark Munro, Mar. 28.

Relativity, Astrophysics, and Space Science

Pacific Coast Gravity Meeting Practice Talks: Paul Schladensky, Ed Porter, March 9.

“The 'Future' of Space Based Gravitational Wave Detectors.”, Jeff Crowder, April 13

“Gravitational Lensing by Voids?”, Tyson Littenberg, April 20

“How to Get a Flat-Field Without a "Flat" Source”, Lewis Fox, April 27.

SolarAstrophysics

“National Astronomy and AURA Membership”, Bill Smith, President of AURA, Apr. 5.

OUTREACH

SPOT: In March and April, the Space Public Outreach Team (SPOT) gave presentations to **over 800 students** in places as far away as Broadus, Montana. SPOT was also involved in several exciting activities including the Native Nexus Conference, Expanding Your Horizons and a presentation at the Bozeman Children’s Museum. Due to the high number of presentation requests, SPOT will continue traveling to many schools throughout May and June.

Expanding Your Horizons: On Saturday, April 16th, MSU played host to 192 middle school girls from across the state for the annual Expanding Your Horizons in Math and Science event. The physics department, with the aid of Angela Des Jardins (a member of the EYH steering committee), contributed several of the 24 workshops available to the students. The Space Public Outreach Team’s star presenter Cami Collins give one of the workshops, “Cassini-Huygens: Mission to Saturn and Titan.” Sytil Murphy gave a workshop, “Stellar Architecture,” which explored the quantum mechanical concepts of stars. “Exploring the Universe: An Experimental Voyage” was presented by Joey Shapiro and Adria Updike. A CS student, Nadine Edmunds, gave an enjoyable workshop (the students were able to play with robots!), “Exploring the World of Robotics.” Finally, and most exciting, was the workshop given by Trish Jibben, “Solar Observations with TRACE.” Trish was able to obtain telescope time for the students, which they used to make movies and take a couple of whole sun images. The girls were able to view their observations on the website after the observation on Tuesday, April 19th. All in all, it was an amazing day for the presenters and the students.

Peaks and Potentials, a summer camp for high ability students in grades 5-9 will be held this year in two 5-day sessions starting June 12 and again June 19. The camp is managed by the Burns Telecom Program with partial funding by the Montana Space Grant Consortium. Program instructors from the Physics Department include Sytil Murphy, John Getty, Michael Poser and Angela Des Jar dins. More information on the program is available at <http://btc.montana.edu/peaks/>

VISITORS TO RESEARCH GROUPS

Montana Governor Brian Schweitzer toured several labs connected with the Physics Department on April 6, 2005:

- Space Science and Engineering Laboratory: tour conducted by Charles Kankelborg, David Klumpar, and Bill Hiscock.
- MSU-Spectrum Lab and SMC-S2CHIP Division facilities: tour conducted by Randy Babbitt, Director of Spectrum Lab and Dr Ralph Hutcheson and Dr. Randy Equall from Scientific Materials.

Spectrum Lab, AdvR, Inc., Altos, Inc., and Scientific Materials' S2CHIP Division hosted a joint open house Tuesday, March 22, 2005 in their new facilities, located in the CFT Buildings complex (formerly VLC).

TRAVEL

Charles Kankelborg, Lewis Fox and Michael Chase traveled to London, Abingdon, UK, to perform MOSES calibration at the Rutherford Appellton Laboratory, Feb. 28-Mar. 21

Hugo Schmidt traveled to San Diego and Los Angeles, CA, to attend SPIE and APS Meetings, Mar. 4-26.

Bill Hiscock and Donna Minton attended the Washington, DC meeting of the National Council of Space Grant Directors, March 1-5.

Joseph Polasik attended the SPIE meeting in San Diego, CA, Mar. 5-19.

Jerry Lapeyre traveled to Berkeley, CA, to conduct experiments at the ALS, Mar. 6-11.

Laura Lediaev presented a poster at the 2005 Electroactive Polymer Actuators and Devices Conference held in San Diego, CA, Mar. 6-9.

Yves Idzerda conducted experiments at the Advanced Light Source in Berkeley, CA, Mar. 10-19.

Ron Hellings traveled to Greenbelt, MD, for a kickoff meeting for LIDS Subcontract at Goddard Space Flight Center, Mar. 13-19

Ezana Negusse traveled to Upton, NY, to conduct a series of experiments, Mar. 13-Apr. 5.

John Neumeier attended a doctoral defense of H. Terashita at Florida Atlantic University, and to collaborate with Dr. Cohn. He then attended the 2005 APS March Meeting Held in Los Angeles, CA, Mar. 15-25.

Dave Klumpar and Brian Larsen visited SWRI in San Antonio, TX, for collaboration, Mar. 16-18.

Rufus Cone gave a talk and attended the March Meeting of the APS in Los Angeles, CA, Mar. 16-24.

Pavel Ivanov conducted experiments at the Synchrotron Radiation Center in Stoughton, WI, Mar. 17-Apr. 5.

Asghar Kayani traveled to Los Angeles, CA, to present a paper at the APS Meeting, Mar. 19-29. Roger Macfarlane gave a talk and attended the March Meeting of the APS in Los Angeles, CA, Mar. 20-24.

Charles Thiel attended the APS Meeting in Los Angeles, CA, Mar. 20-24.

Jerry Lapeyre attended the March Meeting of the APS in Los Angeles, CA, Mar. 20-25. He then traveled to the Synchrotron Radiation Center to conduct experiments, Mar. 23-31.

John Neumeier attended the March Meeting of the APS in Los Angeles, CA, Mar. 20-25.

Dick Smith attended and presented papers at the March Meeting of the APS in Los Angeles, CA, Mar. 20-25.

Neil Cornish, Ed Porter, Daniel Bambeck, Hector Calderon, Vincent Corbin, Jeff Crowder, Carole Holl, Tyson Littenberg, Joe Plowman, Paul Schladensky, and Joey Shapiro attended the Pacific Coast Gravity Meeting in Eugene, OR, Mar. 24-27.

Dave Klumpar and Mike Obland traveled to San Luis Obispo, CA, to deliver MEROPE Flight Unit for integration. Mar. 27-30.

Dave Klumpar, Danny Jacobs and Dylan Solomon traveled to Palo Alto, CA, to participate in MAST Satellite CDR and Planning Meeting at Stanford University, Mar. 31-Apr. 1.

Keith Gilmore attended the Materials Research Society Conference in San Francisco, CA, Mar. 27-Apr.

Jiaping Han attended the 4th Annual Montana SBIR Conference "Charting a course to commercialization", Butte, Montana, March 29-30, 2005.

Marco Liberati and Johnathon Holyrod attended the 3rd workshop on X-Rays and Magnetism in Lake Tahoe, NV, Apr. 3-7.

Dick Smith attended the Montana Academy of Sciences Meeting organizational session in Butte, MT, Apr. 8-9.

Dave Klumpar, Sean Kirn and Timothy Orr traveled to San Luis Obispo, CA, for delivery of MEROPE Satellite, Apr. 10-13.

Bill Hiscock attended the April APS meeting in Tampa, Florida, April 15-19.

Jonathan Cirtain traveled to London, UK, to work with Giulio Del Zanna at MSSI & Hele Mason from the Univ. of Cambridge, and on to Vienna, Austria to present a paper at the EGU Conference, Apr. 16-29.

Dick Smith, Asghar Kayani, and Mike Kopczyk gave a seminar at Idaho State Univ., Pocatello, ID, Apr. 18.

Piet Martens participated in a NASA Preproposal Conference held in Washington, DC, Apr. 20-22.

Dick Smith, Alan Craig, Valentyn Grachov, Mike Kopczyk, Laura Lediaeve, Hongyan Li, Cami Collins, Pat Kujawa, Jacob Lucas, Kasey Lund, James Monds, and Jeff Sadino visited the Pacific Northwest National Lab, Apr. 21-23.

John Neumeier attended the Workshop on Novel Electronic Materials at the University of Kentucky in Lexington, Apr. 24-27.

Dave Klumpar participated in the 2005 Responsive Space Conference and NASA-JPL Town Hall Meeting held in Los Angeles, CA, Apr. 26-29.