

Quantum Times



**New Mexico State University
Department of Physics Newsletter**

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Notes From the Department Head

It has been several years since the Physics Department at NMSU has written a Newsletter, and during that time the Department has undergone many changes. First of all I took over the reins as Department Head when Prof. George Bureson retired. During his Headship, new faculty members were hired in all of our core research specialties: condensed matter physics, geophysics, nuclear physics, optics, and physics education. He left the Department with very strong graduate teaching and research programs. Since then we have continued to build on this excellent foundation. New research areas of materials science and computational physics were added to enhance our existing strengths. A new degree, the Bachelor of Science in Engineering Physics, was created. This degree was designed to provide students with optimal training for employment in high tech industries and national laboratories, as well as for graduate studies in Engineering or Physics. We hope that this new degree will enhance employment opportunities for our graduates, as well as attract more students to NMSU. To accommodate growth in our program and increase interaction with the other sciences, a renovated and expanded Gardiner Hall is now the University's number one capital priority.

However, the department faces many new challenges. There is a national trend of state governments providing a decreased share of university operating costs, which has created increasing pressure on the departments to either reduce the quality of programs or find supplementary funding. At the University of Texas, state support accounts for only 31% of the university budget, and an increasing fraction comes from private funds. NMSU is beginning its first Capital Campaign with the goal to raise funds for endowed professorships, student scholarships, and building needs. We seek alumni assistance to make contact with prospective and corporate foundation donors.



Other Research & Teaching Staff:

- A. Acatrinei (Postdoc.)
- D. Angus (Postdoc.)
- C. Bruce (College Prof.)
- Mi. Burkardt (College Asst. Prof.)
- P. Chylek (Adj. Prof.)
- H. Daw (Prof. Emeritus)
- M. De Antonio (College Asst. Prof.)
- P. de Châtel (Visiting Researcher)
- G. Goedecke (Prof. Emeritus)
- P. Higbie (Adj. Prof.)
- R. Liefeld (Prof. Emeritus)
- D. McKee (Postdoc.)
- K. Morrison (College Asst. Prof.)
- R. Pinnick (Adj. Prof.)
- T. Stromberg (Prof. Emeritus)
- X. Wang (Postdoc.)

Technical & Administrative Staff:

- J. Alexander - Office Staff
- J. Greis - System Administrator
- B. Mauldin - Office Staff
- C. Pennise - Physics Coordinator

Present Graduate Students:

- H. Al-Bataineh, T. Albers,
- S. Alyones, R. Arceo,
- R. Armendariz, J. L. Banuelos,
- T. Bogue, A. Buin,
- K. Coleman, J. Dewald,
- M. Dias, B. Eimer,
- S. El-Khatib, S. Flores,
- V. Francios, E. Gonzalez,
- B. Hannafious, A. Jarrah,
- K. Kothapalli, A. Lugos-Solis,
- J. Montgomery, S. Reynolds,
- R. Ross, L. M. Sandoval,
- J. Schaub, M. Stepanov,
- T. Stevens, S. Tai,
- J. Talla, M. Turk,
- S. Vecherin, W. Wondmagegen,
- D. Yarotski

New Faculty



Assistant Professor Igor Vasiliev

Dr. Igor Vasiliev joined the Department of Physics in August 2002. He received his Ph.D. from the University of Minnesota in 2000. His research focusses on theoretical studies of complex nanoscale systems. Such systems include: atomic clusters & nanocrystals, nanotubes & nanowires and structural defects in crystals, to name a few. His calculations employ a wide range of computational techniques with the emphasis on *ab initio* methods based on density-functional theory.

Dr. Vasiliev is currently involved in an effort to build a high performance parallel computer system at NMSU. As a part of this project, he has constructed a 16-node, 32-processor Beowulf Cluster located in the Computer Room on the 3rd floor of Gardiner Hall (see Research News).

Assistant Professor Seamus Curran

Dr. Seamus Curran joined the Department of Physics in Summer 2003. He received his Ph.D. from the Trinity College in Dublin (Ireland) in 1995. His research focusses on organic-based materials for specific applications in nano electronics, sensors, and bio-delivery systems. This includes device fabrication and materials characterization on the nanoscale. The goal is to produce a controlled nano-material through self-assembly and spectroscopic properties.

Dr. Curran has set up extensive experimental labs that include instruments for Raman, AFM and STM in the basement of Gardiner Hall.



Assistant Professor Boris Kiefer

Dr. Boris Kiefer joined the Department of Physics in Fall 2003. He received his Ph.D. from the University of Michigan in 2002. His research ranges from mineral physics to material sciences. His interests include magnetic structures at low temperatures, their stability and their effects on macroscopic physical properties. He uses computational techniques independent of any experimental input to predict the magnetic behavior of materials.

A second research project aims at the understanding of the effects of solid solutions on physical properties of the Earth's deep interior to complement seismological observations suffering from the complex interplay of phase, composition & temperature.



New Faculty



Assistant Professor Jacob Urquidi

Dr. Jacob Urquidi joined the Department of Physics in Fall 2003. He received his Ph.D. from Texas Tech University in 2001. He was appointed as the most recent LANSCE Professor, which is jointly funded by NMSU and the Los Alamos Neutron Science Center (LANSCE). His research involves the use of neutron & X-ray scattering techniques to study molecular liquids, amorphous materials & proteins. He complements his experimental research with Molecular Dynamics (MD) and Reverse Monte Carlo (RMC) simulations. At LANSCE, Dr. Urquidi is responsible for the Single Crystal Diffractometer (SCD) and he works with LANSCE scientists on instrument upgrades to measure liquid and amorphous materials. At NMSU, Dr. Urquidi has set up a 10-meter Small Angle X-ray Scattering instrument, named LINUS, which is capable of elucidating distances on the order of 100-3000 Å.

Assistant Professor Michael Engelhardt

Dr. Michael Engelhardt joined the Department of Physics in Spring 2004. He received his Ph.D. from Erlangen University (Germany) in 1994. Dr. Engelhardt's appointment, partially funded by the Department of Energy (DOE), includes membership in the Lattice Hadron Physics Collaboration, a DOE-supported initiative with extensive computing facilities at Jefferson Lab. His research focuses on the physics of quarks and gluons, the particles that make-up the protons and neutrons of the nucleus. He studies quark and gluon confinement and the properties of low-lying excitations of the strong interaction. Dr. Engelhardt performs large-scale numerical simulations on massively parallel computers to describe such systems. A typical task is the inversion of very large matrices in order to describe quark propagation.



Don Birx Appointed Vice Provost for Research

Michael V. Martin (President of NMSU) recently appointed **Dr. Don Birx**, the Director of NMSU's Physical Science Laboratory and a faculty member of the Physics Department, to be the new Vice President for Research at NMSU. Dr. Birx received his Ph.D. from the University of Dayton in 1990, and most of his recent research focused on the application of computational physics models to variety of complex systems and artificial intelligence. Despite his very busy schedule, Don Birx takes his responsibilities as a faculty member very seriously, and he taught a course on Energy and Society in Spring of 2004 and he teaches Intermediate Electromagnetic Theory in Fall of 2004.

Research News



Drs. Kiefer, Urquidi & Vasisliev in front of two of their Beowulf Clusters.

Parallel-Computing Facilities

The research interests of Drs Kiefer, Urquidi and Vasiliev range from planetary materials, biophysics, to material sciences. Common to these diverse areas is that one requires flexible computer architectures taking advantage of parallel algorithms.

To date, the Physics Department houses three Beowulf clusters with a combined total of 80 processors, total memory in excess of 80 GByte and disc space of 4500 GByte: one smaller PC-cluster (Xeon master node and sixteen 32-bit Penium 4 computing nodes, 1 GByte memory per processor), and two larger PC-clusters (each with 32 processors., 32-bit XEON, 2 GByte memory per node).

Recently, Drs Kiefer and Urquidi (together with engineering faculty Drs Cook, Ng and Leslie) were awarded an NSF grant to buy an even larger 64-bit PC-cluster, comprised of 100-128 processors. This cluster will be maintained by the Computer Science Department, and further enhance the computational capabilities of our department.

Agile Response Chameleon Coatings (ARCC)

In collaboration with researchers from Wake Forest and University of Florida, Dr. Curran hopes to develop intelligent coatings for stealth fighters in order to render them invisible to the human eye. While current stealth planes deflect radio waves, these new, intelligent coatings (based on optoelectronics) would bend light, blending those fighters into any background, which would make them difficult to focus on.

An additional goal of this project is to develop the coatings such the fighters are also invisible to infrared scanners, attacks on electronic devices and shield the planes from electromagnetic interference.

The Department of Defense has ear-marked \$7.5M for five years to support this collaborative effort.

Dr. Curran believes that such coatings will eventually be used for commercial purposes as well.

The original article can be found in the Research Round-up, by Ellen Davis entitled: *NMSU researcher developing stealth coatings for aircraft.*



ARCC stealth technology will be agile and capable of responding to its surroundings. Coupled with a coating technology that actively assesses aircraft material integrity, the ARCC program will provide a leap forward in asset protection.



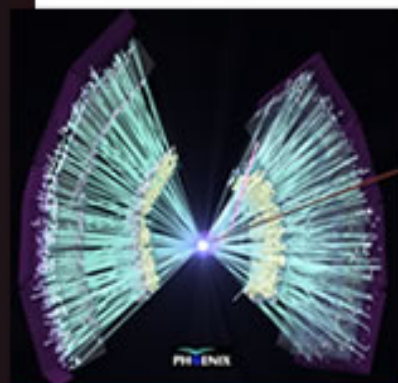
NMSU 10-meter SAXS

Small Angle X-ray Scattering

Dr. Urquidi acquired LINUS, a 10-meter Small Angle X-ray Scattering (SAXS) instrument, from Oakridge National Laboratory. LINUS is perfectly suited to study the arrangement and properties of materials with distances of the order of 100 – 3000 Å, dimensions and separations typical for constructs based on nanomaterials. Once commissioning is finalized (January of 2005), LINUS will be used for the following initial projects:

- * measurement of hot and cold denaturation temperatures of proteins,
- * study of critical phenomena in liquid water, and
- * upgrade of its capabilities to perform small-angle single crystal diffraction.

Research News



Au-Au Collisions as seen on the PHENIX Detector.

Experimental High Energy Nuclear Physics

The **Experimental High Energy Nuclear Physics** group consists of Drs. Kyle, Papavassiliou, Pate, three research associates, four graduate students and one undergraduate student. The NMSU team is involved in three research projects:

1. **PHENIX**: a large experiment (involving more than 400 scientists from 12 countries), located at the Relativistic Heavy-Ion Collider at Brookhaven National Laboratory. One goal of PHENIX is to explore the behavior of nuclear matter at very high densities, and a second goal is the investigation of the intrinsic spin of protons.
2. **G⁰**: an experiment that explores the structure of the proton with focus on the contribution of strange quarks to the proton's electromagnetic properties. This experiment is located at the Jefferson Laboratory in Newport News, Virginia, and it involves about 100 scientists from institutions in the US, Canada, France and Armenia. The study of strange quarks in the proton is intriguing because there are no strange quarks permanently in residence inside the proton! Thus, strange quarks are continuously created and destroyed in the "sea" of particles and anti-particles that exist inside the proton.
3. **FINeSSE**: this proposed project will explore the activities of strange quarks in protons with a focus on how these strange quarks contribute to the spin of the proton. FINeSSE proposes to use neutrino-proton elastic scattering to measure the "strange axial form factor," a quantity that describes the distribution of strange quarks inside the proton, which determines their contribution to the proton spin.

Geophysics Research

Dr. James Ni has been busy preparing for his newest project on the *Mapping the Rivera Subduction Zone*, for which he recently received funding for four years from the NSF. He believes that the results of this project will provide insight to fundamental plate tectonic processes when its spreading center encounters a subduction zone. Together with his colleague Prof. Steve Grand from UT Austin, they traveled to the State of Colima and Jalisco in Mexico to identify suitable locations where temporary stations can be deployed. They also met with colleagues from the universities in Mexico City, Queretaro and Colima, who will be involved in the project. It is believed that the present tectonics of Mexico may be similar the one in the western US about 30-50 Ma, and the results may thus provide some understanding of the present configuration in the US.



A graduate student installs a temporary seismic station

Drs Ni and Hearn continued their work in the INDEPTH (International Deep Profiling of Tibet and the Himalaya) project. In the past, this project involved a major field effort in southern and central Tibet. The future focus will be on northeastern Tibet, designed to test the recent hypothesis that the large plateau underneath that region was formed by stacking of crustal scale slices. This hypothesis contradicts previous suggestions that the plateau was shaped by the lateral flow of hot, weak rocks in the lower crust. In the summer of 2003, a 'scouting trip' to Tibet was organized in coordination with colleagues from Beijing. As a result of this trip, Dr. Ni and his colleagues submitted an INDEPTH-IV proposal to the NSF, proposing to carry out extensive seismic surveys in an attempt to settle the debate as to how this vast, high region originated. The NSF program director already indicated that this project will receive funding in 2007.

Outreach & Education

Seventh Annual Physics Olympics

NMSU Physics hosted its 7th annual Physics Olympics for high school students on the 4th of December. The olympics introduces prospective students to our department in an atmosphere that combines fun, competition, and physics. Teams of high-school students from New Mexico & El Paso area competed in some traditional physics competitions such as the egg drop & bottle rockets, and in some that are less common, such as a rubber-band powered boat race & a new competition in which students were required to send a water-powered dragster down the 85-foot long pipe outside Gardiner Hall. In addition, teams competed in two academic challenges: physics problem solving & Fermi questions. The department provided a pizza lunch for all participants, and Dr. Harold Daw performed his *Physics is Fun* demonstrations afterward. Many SPS students took time out from studying for their finals to help coordinate the event.

K-12 and Community Outreach

The physics department has an active program for outreach to the schools in the area. We have remodeled rooms on the first floor of Gardiner Hall to provide space for undergraduate students to build physics demonstration and to give ample opportunity to visitors to play with those. Most of the visitors have been given to been students from local schools.

We also been give physics demonstrations in a variety of settings, including Aggie Day, the Environmental Health and Science Fair, the NMSU Academic Excellence Day, the Mayfield High School Science Evening, and to teachers and students involved in the NMSU GK-12 program. We continue to expand our repertoire of demonstrations, thanks in part to the work of our undergraduate students and to the Horace Coburn demonstration fund.



Girl Scout Troop 272 performs optics experiments in Gardiner Hall.



Carl E. Wieman (Nobel Prize Winner, Physics, 2001) autographs a physics textbook for one of our undergrads.

Society of Physics Students

NMSU has a very active chapter of the Society of Physics Students (SPS). SPS provides physics majors with an opportunity to develop into active members of the professional physics community, to learn about physics and physicists, and to socialize with each other in both formal and informal settings. This October, 16 members of our chapter traveled to Albuquerque to attend a joint meeting of the American Physical Society, and $\Sigma\Pi\Sigma$ (the physics honor society). NMSU physics undergraduate Rose Chavarria presented results from her research in a talk titled *Polarimetry and Infrared Spectrometry*. Highlights of the meeting included plenary talks from Jocelyn Bell-Burnell on *Pulsars and Extreme Physics*, and from Carl Wieman on *Bose-Einstein Condensates*.

K-12 Teacher Workshop Provides Hands-on Experience

Funded by the New Mexico NSF EPSCoR Infrastructure grant, Drs Curran and Vasiliev organized and ran a 2-day *Workshop on Nanotechnology* for K-12 science teachers at NMSU in fall of 2003. The workshop was attended by almost 30 teachers from New Mexico, and it consisted of lectures & hands-on experiments performed in Dr. Curran's labs.

Outreach & Education



Left to Right: Dr. Ellis, Dr. DeAntonio, Forrest Powell, Christopher Hunter, Cameron Radosevich, (not shown David Jinks).

High School Students Win E-Cybermission Award

Dr. Mike De Antonio advised four 9th grade students from Mesilla Valley Christian School in a research project entitled; *A Device to Measure Ultraviolet Radiation Exposure*. Some experimental support was provided by Dr. Amanda Ellis (a former NMSU post-doc). The students each won \$3000 in bonds in the e-Cybermission competition for this project. These students presented their results at the 2004 APS 4-corners Meeting in Albuquerque

Mike also supervises three undergraduate students (Rose Chavarría, Crystal Elam, Andre Bergsagel) on physics projects related to the field of agriculture; the projects include work on chile, cotton and turf.

LANSCE Winter School on Neutron Scattering

Dr. Nakotte spent some time during his sabbatical leave in 2003-2004 to initiate and help with the organization of a neutron scattering school at the Los Alamos Neutron Science Center (LANSCE), which provided about \$70k of operational funds on a one-time basis. The 1st LANSCE Winter School was held in January 2004 and focused on the topic of Magnetism & Neutron Scattering. It was attended by 30 students from U.S. institutions (from 14 different states) and one overseas institution. The one-week school was at no cost to the participants (and lecturers). Apart from lectures, the school included hands-on neutron experiments on magnetic systems using the spectrometers at LANSCE. Fourteen world-known experts in specific fields of magnetism and neutron scattering presented a total of 16 lectures, and the LANSCE scientific staff taught the experimental portion of the school. The student evaluations

of the school were extremely positive. Encouraged by such response, Drs Nakotte and Urquidi have submitted a proposal to the NSF to secure 50% of needed funding for future LANSCE Winter Schools on Neutron Scattering that will rotate annually between selected topics, such as Magnetism, Soft Matter, Engineering Materials, and Chemical and Biological Applications. LANSCE personnel submitted a similar proposal to the Department of Energy for the rest of the costs.



Participants listen to Heinz Nakotte's lecture on "Magnetic Structures" at the LANSCE Winter School on Neutron Scattering



Left to Right: René Casillas, Gerald Thomas, Heinz Nakotte

Academy for Learning in Retirement

Dr. Nakotte gave an invited talk to the Academy of Learning in Retirement (ALR) in Las Cruces, to about 70 retired professionals, on the subject of Nanotechnology. Among others, his talk was attended by several retired NMSU faculty, including former Arts & Sciences Dean René Casillas and Professor Emeritus Gerald Thomas.

New Engineering Physics Program at NMSU-Physics

Starting in 2003, the Department of Physics has introduced a new undergraduate degree program for a Bachelors in Engineering Physics (EP). The mission of EP at NMSU is to offer an accredited degree that combines high-quality engineering and physics programs to best prepare our graduating students for careers in industry or advanced study in physics or engineering. Students in this program will receive a strong background in the fundamentals of physics and engineering together with the skills to solve real-world problems in an industrial environment. To date, our students have the option to choose either Electrical Engineering or Mechanical Engineering (www.physics.nmsu.edu/index.html). In 2004, we held the first meeting of our EP Advisory Board.

Our EP Program has gotten off to a very successful start with 14 students enrolled for the Fall '04 semester, while the enrollment of 'traditional' Physics majors has only moderately increased.

We had our first graduate with the Bachelor's in EP, John Schaub, who graduated with honors in Spring '04 and has since joined our Ph.D. program.



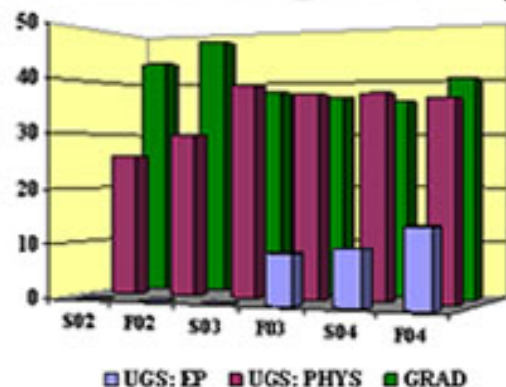
John Schaub

Currently, we are preparing the materials needed for the accreditation of the EP program by the Accreditation Board of Engineering and Technology (ABET). The accreditation process of the EP degree requires substantial detail to measures, assesment, and feedback toward its continuing success.

We invite our alumni to help with the accreditation process. In particular, we would like to have some:

- brief description of the essential skills required in your present occupation in physics or engineering, and
- volunteers to serve as a potential constituency that will provide some feedback on the progress of our EP program.

If you believe that you can provide some help in these or other areas of interest for the ABET accreditation of our EP degree, please contact Gary Kyle (kyle@nmsu.edu).



Enrollment Numbers since Spring of 2002 for undergraduate students in Engineering Physics (UGS: EP) and Physics Majors (UGS: PHYS) & graduate students (GRA).

New Physics Building is NMSU No. 1 Priority

In October 2004, the New Mexico Commission on Higher Education (CHE) selected of the proposed renovation and expansion of Gardiner Hall as the no. 1 capital priority for NMSU and no. 2 among the state universities. If sufficient funding is secured, groundbreaking could start as soon as January 2007. Thus this project could soon come to fruition.

The original 27,000 sq. ft. Gardiner Hall building was constructed in 1958, and the 36,000 sq. ft. research wing was added in 1966. The buildings have had no major renovation since construction; facilities have become outdated and costs to update and maintain the building have escalated. As the department continues to grow, office and laboratory space have become increasingly tight.

The proposed project would renovate the "new" wing and reconstruct the "old" wing; in addition, new space would be added to house the Geology and Astronomy departments, provide additional classroom space, and create new specialized laboratories for materials science and computational physics. It would bring the physical sciences (Astronomy, Chemistry, Geology and Physics) into one quadrangle. The new building will also host an Exploratorium-type Science Museum with planetarium and public lecture facilities as a center for science outreach and literacy in southern New Mexico.

The final project is expected to cost as much as \$27 Million. The CHE has recommended \$12 Million of State funding, and we are currently seeking additional funds from Federal and private sources. We invite anyone who is interested to become involved in the many aspects, such as fundraising, of this exciting new project.

Ph.D.' and Master's Theses 2002-2004



2004

Ahmed Al-Jamel, Ph.D.*J/ψ Production Properties from Polarized Proton-Proton Collisions at 200 GeV*

Advisor: Vassilii Papavassiliou

Abdel Alsmadi, Ph.D.*Pressure Effects on Magnetic Transitions in Strongly-Correlated-Electron Systems*

Advisor: Heinrich Nakotte

Charles B. Cossé, Ph.D.*A Measurement of Ground-level Electron Spectrum from 0.1 GeV – 10.0 GeV*

Advisor: Gary Kyle

Dzmitry Yarotski, Ph.D.*Ultrafast Scanning Tunneling Microscopy*

Co-Advisors: Heinrich Nakotte and Toni Taylor (LANL)

2003

Michael J. Campin, Ph.D.*Microstructural Investigation of Copper Corrosion: Influence of Humidity*

Co-Advisors: Jane Zhu and Heinrich Nakotte

Sung Chun Chang, Ph.D.*Magnetic Transitions in some Strongly-Correlated-Electron Systems*

Advisor: Heinrich Nakotte

Andrew Scott Hoover, Ph.D.*The PHENIX Muon Spectrometer and J/ψ Production in 200 GeV Center of Mass Energy Proton-Proton Collisions at RHIC*

Advisor: Stephen Pate

David Wayne McKee, Ph.D.*Nuclear Transparency and Single Particle Spectral Functions from Quasi-elastic Electron Scattering Reactions up to Squared Momentum Transfers of 8.1 GeV²*

Advisor: Stephen Pate

Joseph Rudolph Montoya, Ph.D.*Enhanced Raman Scattering of Biological Molecules*

Advisor: Robert Armstrong

Ramya Rajaram, M.S.*Crystal Fields in Uranium Dioxide*

Advisor: Heinrich Nakotte

Jungtae Rha, Ph.D.*An Adaptive Shack-Hartmann Wave Front Sensor using a Liquid Crystal Device*

Advisor: Michael K. Jiles

Katyayani Seal, Ph.D.*Optical and Electrical Transport Properties of Semicontinuous Metallic Films*

Co-Advisors: Z. Charles Ying and Heinrich Nakotte

Alexei V. Vezolainen, Ph.D.*Dynamics of Equatorial Highlands on Venus*

Advisor: Viatcheslav S. Solomatov

2002

Mohammed Khalil Al-Quadi, Ph.D.*Inclusive Pion Reactions at Intermediate Energies*

Advisor: William Gibbs

Fedda Yusuf Al-Zoubi, Ph.D.*Nonlinear Scattering from Metal Fractal Aggregates*

Advisor: Robert L. Armstrong

Lowell Alden Cummings, Ph.D.*An Alternative to Dark Matter*

Advisor: Richard L. Ingraham

Rifa El-Khozondar, Ph.D.*Numerical Modeling of Microstructural Evolution in Metals, Ceramic and Rocks*

Advisor: Viatcheslav S. Solomatov

Anton V. Malko, Ph.D.*CdSe Nanocrystal Quantum Dots: From Fundamental Physics to Optical Nanodevices*

Co-Advisors: Z. Charles Ying and Victor Klimov (LANL)

Viktor Anatolyevich Podolskiy, Ph.D.*Optical Properties of Nanocomposites: Percolation Films, Nanowires, and Nanoholes*

Advisor: Vladimir M. Shalaev

Sudip K. Seal, Ph.D.*Investigating Mesons on the Transverse Lattice*

Advisor: Matthias Burkardt

Jason C. Webb, Ph.D.*Measurement of Continuum Dimuon Production in 800-GeV/c Proton-Nucleon Collisions*

Advisor: Vassilii Papavassiliou

Xiaofeng Xiao, M.S.*Inversion for Crustal Thickness and Mantle Velocity beneath the INDEPTH-III Tibet Seismic Profile*

Advisor: Thomas Hearn

Awards 2002-2004



Gilbert Cano

Gilbert Cano (Ph.D., 1974) was recognized as one of three 2004 **Distinguished Alumni of NMSU's College of Arts and Sciences**. Following his graduation from NMSU, Cano was thirty-two years with Sandia National Laboratories, from which he retired in 1996. During his scientific career, Cano became a world renowned physicist who has published widely in the open scientific and security classified literature. Dr. Cano served on the NMSU Physics Department Advisory board throughout the 80s and 90s and was appointed, by the Governor to the Board of Regents of the New Mexico Institute for Mining and Technology, Socorro, in 1985. Dr. Cano was also awarded the **Outstanding and Distinguished Alumni Award of NMSU's Physics Department** in 2004.

Robert Armstrong was awarded the **NMSU Regents Professorship** in 2003.

Matthias Burkardt was elected **Fellow of the American Physical Society** for his contributions in quantum chromo dynamics in 2004.

Sami El-Khatib was awarded the highly competitive **Seaborg Fellowship** from Los Alamos National Laboratory in the summer of 2004.

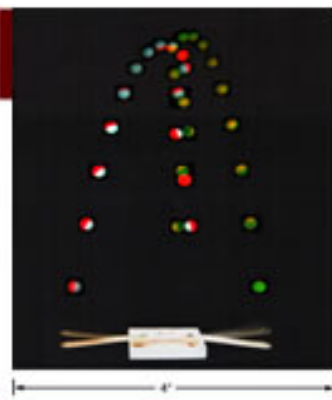
Heinrich Nakotte received the **Award for Exceptional Achievements in Creative Scholarly Activities** from NMSU's University Research Council in 2003.

James Ni was awarded the **Gardiner Professorship** from the NMSU Physics Department in 2003.

Katyayani Seal won the **Award for Best Student Presentation at the APS 4-corners section meeting** in Salt Lake City, Utah, in 2002.

The **Outstanding Senior Award** of the Physics Department was given to **Christopher M. Valdez** for 2001-2002, **Charles Mundy-Castle** for 2002-2003, and **Jeffrey Montgomery & John Schaub** for 2003-2004.

The following students were inducted into $\Sigma\Pi\Sigma$ (the Physics honor society): 2004 – **Kimberly Syers** and **Paul Rotering**; 2003 – **Katrina Clemens, John Schaub, Jeffrey Montgomery & Jose Leo Banuelos**; 2002 – **Charles Mundy-Castle & Deois Ua Cearnaigh**; 2001- **Suzanne Higgason, Alfonso Rodriguez, Christopher Valdez & Heather Witley**.



Launcher and the paths of launched magnetic marbles.

Playing With Magnets

Dr. Liefeld (Emeritus) and two NMSU physics students, Aaron Berger and John Schaub, have been playing with small magnetic dipoles. The first paper describing their activities, entitled, *The dipole-dipole interaction at a glance*, is about to be published in The American Journal of Physics. Most of the "experimental data" is not in the note itself and is only available "on-line". You may see it at <http://dipoledynamics.nmsu.edu>. A second paper, entitled *The dipole-dipole interaction - a second glance, which shows the measured forces between small magnetic dipoles of several kinds and sizes for small separations and particular orientations*, is "in progress".



Alumni News



Abdel-Kha Alsmadi (Ph.D., 2004) recently joined Argonne National Laboratory as a post-doctoral fellow where he will work on neutron reflectometry of magnetic thin films.

Sean Blanchard (Ph.D., 1998), having left Lockheed Martin Idaho Technologies Co., now works for Sun Microsystems at Los Alamos National Laboratory.

Sung Chun Chang (Ph.D., 2003) is presently a post-doctoral fellow at Ames Laboratories, Iowa where he works on neutron scattering of magnetic materials.

Lowell A. Cummings (Ph.D., 2002) has a faculty position at the Merchant Marine Academy on Long Island, NY.

Rifa El-Khozondar (Ph.D., 2003) is now a physics teacher in Gaza.

Daniel Gabel (Ph.D., 1998) is with the Hanscom Air Force Base in Bedford, Massachusetts.

Robert W. Garnett (Ph.D., 1988) is the Physics Design and Theory Team Leader at LANSCE, LANL.

Royce James (B.S., 1999) joined the graduate program at Columbia University, where he pursues a Ph.D. on fusion using magnetic confinement in a Tokamak.

Kenneth F. Johnson (Ph.D., 1976) is Accelerator Operations Manager at LANSCE, LANL.

Won-Tae Kim (Ph.D., 2000) is now with LaSys Inc., a privately held company based in Las Cruces.

Vadim M. Markel (Ph.D., 1996) is now a faculty member in the Department of Radiology at the University of Pennsylvania.

Marcos Montes (B.S., 1985) is a staff member at the National Research Laboratory of the Navy. After graduating from NMSU, he went on to receive a Ph.D. from Stanford University.

Paul Pellegrino (Ph.D., 1996) works with the US Army Research Laboratory in Adelphi, Maryland.

Viktor A. Podolskiy (Ph.D., 2002) accepted a tenure-track faculty position at the Physics Department of Oregon State University in Corvallis, Oregon.

Agus Purwanto (Ph.D., 1995) is the group leader of the Inelastic Neutron Scattering Group at the Research Reactor in Tangerang, Indonesia.

Ramya Rajaram (M.S., 2003) joined the graduate program at the University of North Carolina, Chapel Hill, where she pursues a Ph.D. on the properties of carbon nanotube films.

Eric Sandvol (Ph.D., 1995) occupies a faculty position at the Department of Geological Sciences of the University of Missouri in Columbia.

Raman Shah (Ph.D., 1989), having left Oracle, now works for the Computer Science Corporation in Bethesda, Maryland, as a computer scientist.

Javier V. Urbina, a former NMSU Physics student, was recently approved as an internal candidate for Governor of State for the state of Chihuahua, Mexico.

Qihua Zhao (Ph.D., 1997) is a Senior Research Associate, Radiation Oncology, University of Michigan.

Obituary

William J. Leach II died unexpectedly at the age of 62. William Leach, a physics alumni from 1974, received his Ph.D. on Quantization near the Light Cone under the supervision of Professor Tuan Chen. After graduating from NMSU, he was a long-term employee with White Sands Missile Range.

Request for Donations

The Physics Department has several endowment funds, which are administered by the University Foundation. The department is extremely grateful to its alumni, its friends, and its former faculty members who have so generously established or contributed to these funds.

Our endowments and their uses are the following:

for **graduate fellowships**: the **George W. Gardiner Fund**, the **Albert and Mabel Burris Fund**, and the **General Physics Department Fund**.

for **financial aid to undergraduates**: the **H. Bartell and Doris Williams Memorial Fund** and the **Hugo Bezdek Fund**.

for **instructional laboratory equipment**: the **Physics Department Laboratory Equipment Fund**.

for **lecture demonstration equipment**: the **Horace Coburn Physics Lecture Equipment Fund**.

for **awards given to outstanding students in freshman and sophomore laboratory courses**: the **Marc Miller-Velma McClellan Fund**.

for **supplementary support of the activities of outstanding faculty members**: the **George W. Gardiner Professorship Fund**

for **general use of the Physics Department**: the **Albert and Mabel Burris Endowment Fund**.

for **campus visits and public talks by outstanding persons**: the **George W. Gardiner Memorial Lecture Fund**.

While gifts to these are very gratifying and important to the successful operation of the department, we are always in need of funds and we can always find a good use for them.

If any of you feel in a generous mood and would like to contribute to any of these funds, or just to send a gift, you can feel sure that it will be greatly welcomed. If you should feel in a particularly generous mood and would like to establish an endowment of your own (minimum \$10,000, by University Foundation rules), we would be eternally grateful, since an endowment, like diamonds, is forever. If you would like to make a contribution to help us, please cut out and use the form below.

This form can be sent to one of the following addresses:

University Advancement, MSC 3590
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All contributions to the Physics Department at NMSU are tax-deductible as allowed by law. For more information on ways in which you can make a difference in the Physics Department, please contact the Department Head, Dr. Gary Kyle, at: 505-646-3831 or gkyle@nmsu.edu.



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