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SPECTRUM

FOR ALUMNI & FRIENDS OF THE DEPARTMENT OF PHYSICS & ASTRONOMY

UNIVERSITY OF NEBRASKA-LINCOLN

ANTHONY F. STARACE, EDITOR

Materials Researchers Awarded \$5.4 Million NSF Grant

BY DAVE FITZGIBBON/
UNIVERSITY COMMUNICATIONS

Editor's Note: The growing materials research group at UNL achieved one of its goals this year, the award of a 6 year MRSEC for "Quantum and Spin Phenomena in Nanomagnetic Structures." David J. Sellmyer is the Center Director. Department faculty participating in the Center include Shireen Adenwalla, Bernard Doudin, Peter Dowben, Stephen Ducharme, Sitaram Jaswal, Roger Kirby, Diandra Leslie-Pelecky, Sy-Hwang Liou, Ralph Skomski, and Evgeny Tsymbal. The focus of the center is on fabricating and studying new nanomagnetic structures and materials. In what follows we reprint the UNL news release of the award.

Lincoln, Neb., Sept. 23, 2002 — Materials researchers at the University of Nebraska-Lincoln have won a prestigious \$5.4 million grant from the National Science Foundation. The grant establishes a Materials Research Science and Engineering Center (MRSEC) at UNL, making it one of 27 such elite centers in the nation.

"This is a very exciting accomplishment for UNL. Competition for these centers is intense and only the top research programs in the country win these awards," said UNL Chancellor Harvey Perlman.

The MRSEC is an outgrowth of UNL's Center for Materials Research and Analysis, and involves scientists from the departments of physics and astronomy, chemistry, and mechanical



MRSEC Group: Some of the MRSEC faculty at a September 24th, 2002 celebration hosted by Chancellor Harvey Perlman and Vice Chancellor for Research Prem Paul to recognize the NSF award. Clockwise from left: Diandra Leslie-Pelecky, David J. Sellmyer, Bernard Doudin, Roger Kirby, and Evgeny Tsymbal.

engineering, and the School of Biological Sciences whose research focuses on nanomagnetic structures. Their work in magnetic materials at the nanoscale — as small as one-billionth of a meter — has applications in advanced computing and data storage systems, handheld electronic devices, advanced sensors, and possible future medical technologies.

"Nanoscience and nanotechnology are amazingly creative new subfields of materials science," said David Sellmyer, UNL physicist and director of the new center. "We are delighted at the opportunities this center will bring to students at UNL."

UNL nanomagnetism researchers are nationally recognized for

their theoretical and experimental work, and fabrication of new materials. In just the last two years, their research has included the synthesis of the first magnetic polymer or "plastic magnet" and has generated six patents granted or filed on devices for data storage, portable electronics and optical sensors. The MRSEC grant illustrates the success of Nebraska's investments in UNL research, said Prem Paul, UNL vice chancellor for research and dean of graduate studies.

"Our stature in materials research and nanotechnology is a direct result of Nebraska Research Initiative funding in the past decade. Now we are seeing the return on that investment," Paul said.

The grant funds more than research projects, Sellmyer said. Training of graduate and undergraduate students, and programs for educational outreach and technology transfer to business and industry are included in the center. The six-year grant will fund salaries for two post-doctoral fellows, 14 graduate students and 10 undergraduate students. It also funds a program that brings high school teachers and students to campus for research experiences, recruitment of graduate students from underrepresented groups, and supports a "Women in Science" program for high school students.

The center's research and its collaborations with industry partners such as IBM, Seagate, Hewlett-Packard, and developing relationships with Nebraska companies, hold high potential for inventions and discoveries that can be patented and commercialized. A recent example is a small, powerful neutron detector developed at UNL that could be used to detect hidden nuclear devices.

UNL's MRSEC grant is one of only three new awards made this year. Other institutions with MRSEC grants include the California Institute of Technology, Massachusetts Institute of Technology, Carnegie Mellon University, Harvard University and Princeton University. ■

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Editors Note: In case you missed us, please note that there was no issue of Spectrum published during the 2002-2003 academic year. Consequently the present issue is larger than usual. It is intended to bring you up to date on news and events of the two years since our last issue of Spectrum up to Spring 2004.

Moore Leads ADAPT Workshop in Chile

Christopher J. Moore (M.S. 1992) presented a workshop on “College Teaching and the Development of Reasoning” to more than 30 faculty at the Universidad de Tarapacá in Arica, Chile during 14–15 November 2002. Moore’s invitation stemmed from the interest of the faculty at the University of Tarapacá to initiate a multidisciplinary program for college students patterned after the successful ADAPT (Accent for Developing Advanced Processes of Thought) program developed and taught at the University of Nebraska under the leadership of Professor **Robert Fuller** from 1975–1997. Moore worked with Fuller in the ADAPT program and also helped develop materials for undergraduate hands-on multimedia physics laboratories.

The ADAPT program provided an environment for college freshmen to develop cognitive reasoning patterns based on the work of Jean Piaget (a Swiss cognitive psychologist who studied the phases and processes of intellectual development in children and young adults) and Dr. Robert Karplus (a physicist

at the University of California–Berkeley who used Piaget’s ideas to develop the learning cycle method to teach reasoning skills to students in science classes). Upon receiving the request for such a workshop from the faculty at Tarapacá University, Fuller suggested that it would be most appropriate for Moore to present the workshop as he had lived and been raised in Chile.

During the workshop, for which Moore translated all materials into Spanish, participants took part in active learning activities that examined how students reason. They also learned methods for developing student cognitive skills, and how to incorporate these into college teaching. Faculty participants included the Dean of Education and Humanities, the Director of the Education department, and professors from over 8 different disciplines including anthropology, physics, biology, math, and linguistics.

Moore is currently the Educational Outreach Coordinator at the Synchrotron Radiation Center of the University of Wisconsin–Madison. On November 16, 2002,



Christopher J. Moore lectures in Iquique, Chile

before returning to Wisconsin, Moore gave a lecture to the faculty of the Universidad Arturo Prat in Iquique, Chile on why it is important for college students to develop formal reasoning. The faculty expressed an interest in having a similar ADAPT workshop presented at their university. ■

Debra Fickler Speaks at Recognition Luncheon

Debra J. Fickler (formerly Cleveland) (B.S. 1988) spoke on May 8th, 2003 at the Department’s Recognition



Debra J. Fickler (formerly Cleveland)

Luncheon, held annually to honor Department graduates. Fickler is currently an intellectual property lawyer,

dealing primarily with patents, trademarks, copyrights, etc. She is in private practice living and working just outside Chicago.

The title of her address was “Physics and Everyday Life,” in which she discussed how physics has influenced her career and contributes to her avocation (drag racing). She related how physics was the only subject in which she did not have a grade of “A” in high school. A serious gymnastics accident that led to

much time in hospitals had her thinking of pursuing nursing as a career. Thus she entered UNL as a biology major. She credits Professor **Paul Burrow**, who taught Physics 141 for Life Science students, and the Department’s strong laboratory courses with influencing her to become a physics major.

Upon graduation from UNL, Fickler went to work for McDonnell Aircraft Company in St. Louis, where she worked in the engineering department on non-destructive materials testing. She was the only one in her group without an engineering degree.

She was involved with using ultrasound, holographic imaging, x-ray imaging, and both electrical and magnetic methods to test various materials (such as, e.g., graphite, plastics, and advanced metals) that are used in aircraft. Among the aircraft she tested for damage from takeoffs and landings were

the F-4 Phantom, the F-5 Eagle, the F/A-18 Hornet, and the AV-8B Harrier. For example, she was involved with testing the trailing edge flap of the F/A-18 Hornet, which is a carrier-based jet. She noted to graduates that whereas science is “pure,” engineering requires one to think outside the box to analyze real-world situations using the science one knows.

Fickler became involved in a marketing project, which led McDonnell to send her to the University of Montana to study intellectual property law. She found the study of law intellectually challenging. She was a member of the University of Montana’s Trial Advocacy Team that won (in its category) the American Trial Lawyer Association’s national championship. She returned to St. Louis to continue working for McDonnell, finishing her law degree at the University of St. Louis. Upon getting her

degree, she took an internship in environmental engineering with the U.S. Justice Department.

While Fickler’s current profession is law, her passion is drag racing. She races herself. She also takes great interest in the technology and physics that make for winning race cars. She specializes in intellectual property related to high performance automobiles. She and her husband Kyle are involved with a company called Aeromotive, Inc. that makes components for race cars and also sponsors race cars. Debra is also a Board Member and General Counsel to the Drag Racing Association of Women (DRAW). Among her other accomplishments, Debra was named Miss South Dakota in the 1984 Miss America Pageant. She and her husband became parents on 31 December 2003 with the birth of a girl, Danika Carrera. ■