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Prestigious NSF Career Awards Go To Four Young UNH Faculty

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DURHAM, N.H. -- Four University of New Hampshire faculty members have received prestigious Faculty Early Career Development (CAREER) Awards from the National Science Foundation (NSF). The 2007 recipients are assistant professors Silas Beane, physics; Erin Bell, civil engineering; Per Berglund, physics; and Brad Kinsey, mechanical engineering. Previous UNH recipients of the five-year award who are still pursuing CAREER-funded research are Jo Daniel, assistant professor of civil engineering; Serita Frey, associate professor of natural resources; Rob Griffin, assistant professor of earth sciences; Karsten Pohl, associate professor of physics; Julia Rodriguez, associate professor of history and women's studies; and Elizabeth Varki, associate professor of computer science.

The CAREER awards, which range from $400,000 to $600,000 over five years, go to faculty members in the early stages of promising research and education careers in a variety of disciplines. Awardees are distinguished as leaders for their extensive research accomplishments and noteworthy educational contributions.

"These grants provide important seed money early in a young faculty member's career, and many recipients are able to leverage the awards and the prestige they bring for additional funding. A CAREER award sets a direction for important faculty research," says John Aber, vice president for research at UNH. "It's a tribute to these young scientists – and to UNH as a research institution – that we had more CAREER award recipients this year than any other." Aber notes that UNH actively encourages young faculty members to apply for these awards by hosting educational forums and providing assistance.

Beane's CAREER proposal, "Lattice Quantum Chromodynamics (QCD) Calculations of Nuclear Interactions," outlines a program to perform pioneering calculations of simple nuclear properties using lattice quantum chromodynamics, a form of quantum chromodynamics amenable to large-scale supercomputer simulations. In addition, Beane proposes to perform precision lattice QCD calculations of fundamental particle properties that are essential for a deeper understanding of the Standard Model of particle physics and its possible extensions. (full abstract)

Bell's research, "Integrating Structural Health Monitoring, Intelligent Transportation Systems and Model Updating Into a Bridge Condition Assessment Framework," aims to develop a framework for assessing the condition of bridges in a way that integrates information collected through structural health monitoring (SHM) and intelligent transportation systems (ITS) into a model updating program for highway bridge decision-making and management. "There are several challenges that have limited the successful use of model updating for assessing the condition of bridges," says Bell. "My research proposes to address two of these challenges – modeling error and measurement error – by advancing the analytical and experimental components of model updating." The proposed model updating procedure will exploit SHM and ITS data for a selected bridge in New Hampshire providing information relating to the performance (SHM) and usage (ITS) of the bridge. (full abstract)

Berglund will use his award to explore "Topics in String Compactifications." "String theory has emerged as a leading candidate for a quantum theory of gravity, that is, a theory that encompasses both quantum mechanics and Einstein's theory of general relativity," says Berglund. "A remaining challenge is the identification of the appropriate set of background conditions relevant to the formation of our universe."

He will use constraints from cosmology, such as the cosmic microwave background, to put restrictions on the inflationary type potentials obtained from string theory. Another aspect of Berglund's research is the study of black holes in string theory. This will provide important information in trying to understand the black hole information puzzle. (full abstract)

Kinsey's "Development of Hyperplastic and Superplastic Microforming Processes and Related Educational Activities" will utilize a combined fundamental and applied research approach to create effective hyperplastic (high strain rate) and superplastic (elevated temperature with small grain size) microforming processes. At the macroscale, these processes are too slow and energy intensive to be practical for high production rate applications, but at the microscale, due to the reduced energy and force requirements, these processes will provide for a low-cost, compact processing technique. The knowledge gained through this research at the microscale will lead to the advancement of microscale systems for energy generation, environmental monitoring, and biomedical applications. Further, undergraduate and graduate students will benefit from the integration of research results into course material, international experiences, and involvement in this industrial relevant, multidisciplinary research. (full abstract)

Educational outreach is built in to the cutting-edge research of all four CAREER recipients. Through the construction of simple computer programs, Beane's research will also focus on the teaching of elementary physics at the high-school and undergraduate levels. Bell will provide educators with a fun and educational activity using buildable bridge models that tell the story of engineering in relation to social studies, science and math. Berglund plans to capitalize on the existing infrastructure at the University of New Hampshire for interactions with high schools by bringing cutting-edge science into local high schools. And Kinsey will capitalize on the nature of the hyperplastic and superplastic forming, which lends itself to high school outreach activities, through physics principles such as impact mechanics and chemistry principles such as grain size and structure.

The National Science Foundation established the CAREER program in 1995 to help top-performing scientists and engineers develop their contributions and commitment to research and education early in their careers. Awards go to those working in the physics, biology, geology, engineering, mathematics, computer science, social and behavioral science, economics, and education and human resources.