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2011 Packard Fellowships in Science and Engineering Awarded to Sixteen Researchers

LOS ALTOS, California—The David and Lucile Packard Foundation has named 16 talented scientific researchers from universities across the country as the 2011 recipients of Packard Fellowships for Science and Engineering. Each Fellow will receive an unrestricted research grant of \$875,000 over five years.

The Packard Fellowship program was established in 1988 to allow the nation's most promising professors to pursue science and engineering research early in their careers with few funding restrictions and limited reporting requirements. The program arose out of David Packard's commitment to strengthening university-based science and engineering programs in recognition that the success of the Hewlett-Packard Company, which he cofounded, derived in large measure from the research and development in university laboratories.

By supporting highly creative professors early in their careers, the Foundation hopes to develop scientific leaders, furthering their promising work in science and engineering and supporting their efforts to train the next generation of scientists.

"It is the Packard Foundation's honor to support some of the nation's most talented scientific researchers," said Lynn Orr, Keleen and Carlton Beal Professor at Stanford University, and Chairman of the Packard Fellowship Advisory Panel. "These talented professors are tackling some of the critical scientific questions of our time. Their cutting edge research has the ability to profoundly impact our lives."

Over the past 23 years, the Packard Fellowships program has awarded \$302 million to support 473 faculty members at 52 top national universities. It is among the nation's largest nongovernmental fellowships, designed with minimal constraints on how the funding is used to give the Fellows freedom to think big and look at complex issues with a fresh perspective. Packard Fellows have gone on to receive additional awards and honors, including the Nobel Prize in Physics; the Fields Medal; the MacArthur Fellowships; and elections to the National Academy of Sciences and the National Academy of Engineering.

Packard Fellows must be faculty members who are eligible to serve as principal investigators engaged in research in the natural and physical sciences or engineering, and must be within the first three years of their faculty careers. Disciplines that are considered include physics, chemistry, mathematics, biology, astronomy, computer science, earth science, ocean science, and all branches of engineering.

The 2011 Fellows were selected by the Packard Fellowship Advisory Panel, a group of twelve nationally-recognized scientists, and approved by the Packard Foundation Board of Trustees, from a field of 100 researchers nominated by presidents of 50 universities that participate in the Packard Fellowship program.

The recipients of the 2011 Packard Fellowships in Science and Engineering are:

Bogdan Bernevig

Department of Physics, Princeton University

Discipline: Physics

Bernevig's research focuses on understanding the existent states of matter, discovering new ones, analyzing the possible types of symmetries that these states might have, and proposing experiments that would confirm or falsify the theoretical predictions.

Dino Di Carlo

Department of Bioengineering, University of California, Los Angeles

Discipline: Engineering - Chemical or Biological

Di Carlo's project aims to establish mechanical, rather than molecular, properties of cells as clinically useful and low cost indicators of patient health. The approach takes advantage of microscale fluid physics to sequentially align, squeeze, and measure thousands of cells per second to potentially identify cancer, infection, and transplant rejection.

Michael Fischbach

Department of Bioengineering and Therapeutic Sciences, University of California, San Francisco

Discipline: Biochemistry

Fischbach's laboratory studies drug-like molecules produced by human gut bacteria, which they believe are a novel form of communication between 'friendly' bacteria and the host. By identifying and studying these molecules, they will gain insights into diseases linked to the gut microbiota such as Crohn's, diabetes and obesity.

Woodward Fischer

Division of Geological and Planetary Sciences, California Institute of Technology

Discipline: Geosciences

Fischer studies the coevolution of life and surface environments through fundamental transitions in Earth history, employing techniques from field geology, analytical chemistry, and biology. His primary focus is aimed at understanding the evolution of photosynthesis and rise of atmospheric oxygen, and the causes and consequences of mass extinctions.

Naomi Ginsberg

Department of Chemistry, University of California, Berkeley

Discipline: Chemistry

Through novel imaging strategies, Ginsburg aims to determine how the structure of complex materials employed in natural and artificial light harvesting impacts the multiple stages of solar energy conversion from light absorption to photovoltage, and also to characterize real-time *in situ* biomolecular interaction dynamics, such as those in enzyme catalysis.

Seth Herzon

Department of Chemistry, Yale University

Discipline: Chemistry

Herzon's research seeks to design, synthesize, and study transition metal catalysts that exhibit novel chemical reactivity and apply these catalysts to the development of synthetic transformations of broad utility, with a focus on the development of fundamental bond-forming reactions.

Michael Jewett

Department of Chemical and Biological Engineering, Northwestern University

Discipline: Engineering - Chemical or Biological

Jewett is developing cell-free biology as an enabling technology for biomanufacturing life-saving therapeutics, sustainable fuels, and novel materials, both quickly and on-demand. He focuses on designing, constructing, and modifying biological systems involved in protein synthesis and metabolism, with promise to advance new paradigms for synthetic biology.

Takaki Komiyama

Section of Neurobiology and Department of Neurosciences, University of California, San Diego

Discipline: Neuroscience

Komiyama's research uses high-resolution *in vivo* imaging to study brain activity during behavior and how it is modified by experience and diseases.

Jared Lewis

Department of Chemistry, University of Chicago

Discipline: Chemistry

Lewis is creating artificial metalloenzymes, hybrid catalysts that combine the reactivity of synthetic metal cofactors with the evolvability and selectivity of enzymes, to augment the biosynthetic capabilities organisms for chemical production.

Peter McIntyre

Department of Zoology, University of Wisconsin, Madison

Discipline: Ecology, Evolutionary Biology

McIntyre analyzes global patterns in the spectacular diversity of freshwater fishes in order to understand fundamental evolutionary processes, their consequences for fishery productivity, and how best to conserve species. These analyses will elucidate natural and human controls on aquatic biodiversity while furthering efforts to ensure food security for human populations.

Xiaoliang Qi

Department of Physics, Stanford University

Discipline: Physics

Qi's primary research focuses on topological states of matter, which are quantum states that are distinguished from ordinary states by some robust properties, such as how electrons can move on their surface. Materials in topological states may lead to new electronic devices and new candidates for quantum computation.

Cindy Regal

Department of Physics, University of Colorado, Boulder

Discipline: Physics

Regal's proposed research will develop deterministic control of single neutral atom motion in microscale laser traps, and use this control within arrays of trapped atoms to model computationally intractable physics of complex materials and to advance prospects for enhanced computation using quantum mechanics.

Charles Schroeder

Department of Chemical and Biomolecular Engineering, University of Illinois, Urbana-Champaign

Discipline: Engineering - Chemical or Biological

Schroeder's research aims to develop a new class of biophotonic probes based on dendritic polymer nanomaterials for ultra-resolution imaging, which will provide new chemical tools to study biological processes and intracellular events at molecular-scale resolution.

Alicia Soderberg

Department of Astronomy, Harvard University

Discipline: Astronomy, Astrophysics, Cosmology

Studies of dying stars and their catastrophic demise in supernova explosions have traditionally focused on optical data. Yet puzzles remain, including the final stages of stellar evolution.

Drawing from two new astronomical telescopes operating in the radio band, Soderberg aims to close the gap in our understanding of stellar death.

Brent Waters

Department of Computer Science, University of Texas, Austin

Discipline: Computer/Information Sciences

Waters is laying the foundation for a new vision of encryption called Functional Encryption. Instead of encrypting to individual users, in a Functional Encryption system, one can embed any access policy into the encrypted data itself. In addition, he is interested in understanding the foundational underpinnings of cryptography.

Junrong Zheng

Department of Chemistry, Rice University

Discipline: Chemistry

Zheng's research focuses on developing multiple-dimensional, full-spectrum vibrational spectroscopic methods to determine three dimensional molecular structures and conformations in liquids, solids, and interfaces with an ultrafast temporal resolution.

The David and Lucile Packard Foundation is a private family foundation created in 1964 by David Packard (1912–1996), cofounder of the Hewlett-Packard Company, and Lucile Salter Packard (1914–1987). The Foundation provides grants to nonprofit organizations in the following program areas: Conservation and Science; Population and Reproductive Health; and Children, Families, and Communities. The Foundation makes national and international grants and also has a special focus on the Northern California counties of San Benito, San Mateo, Santa Clara, Santa Cruz, and Monterey. Foundation grantmaking includes support for a wide variety of activities including direct services, research and policy development, and public information and education. The Foundation does not make grants intended to influence legislation or support candidates for political office. Foundation grant awards totaled \$234 million in 2010. The Foundation expects grantmaking awards of up to \$234 million in 2011. Learn more at www.packard.org.

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