

UC SANTA BARBARA

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Eileen Conrad

## **\$1 Million Keck Foundation Grant Improving Our Knowledge of How Earthquakes Work**

With a \$1 million grant from the W. M. Keck Foundation, of Los Angeles, UC Santa Barbara researchers expect to advance, and hopefully, revolutionize techniques used to analyze earthquake data and estimate seismic hazards.

The grant will fund the development of the Keck Foundation Program for Interdisciplinary Studies in Materials Science and Seismology, under the direction of UCSB physicist Jean Carlson.

A team of physicists, engineers, materials scientists, and geoscientists will collaborate on research that addresses some of the most outstanding and overlapping problems that arise in seismology and materials physics.

The program combines UCSB's strengths in science and engineering and connects fundamental progress in understanding complex processes in materials such as friction, fracture, and deformation with seismological applications.

The field is poised for major advances due to recent breakthroughs in the theoretical and experimental understanding of materials many stemming from UCSB researchers, and the rapid, worldwide growth in computational capabilities.

"This rare integration of specialists from such a divergent array of disciplines is likely to yield scientific and technological breakthroughs that cannot be anticipated at this time," said Carlson.

"UCSB is excited to embark on this new visionary partnership with the Keck Foundation which will make possible innovative interdisciplinary research to understand the basic science of earthquakes.

The discoveries will contribute to the improvement of the safety and quality of our lives tomorrow," said UCSB Chancellor Henry T. Yang.

One of the fundamental issues in seismology today is understanding the dynamics of rupture in the Earth's crust.

"If we knew more about the physics of rupture, we might be able to explain why some earthquakes are small and others are huge," said Carlson.

A related goal of research in earthquake dynamics is estimating regional hazards.

Understanding when and where an earthquake is likely to occur, and how much damage it is likely to cause, requires understanding the triggering mechanisms that initiate dangerous events and the ground motion that they produce.

The new knowledge will contribute to the understanding of seismic hazards, through the development of more accurate physical models for both interpreting seismograms and projecting ground motion based on a simulated rupture.

Development of more accurate, physical descriptions of friction, fracture, and deformation of materials will also be of use in a wide range of environmental and technological applications, including transportation, robotics, and erosion.

"What makes the Keck Program for Interdisciplinary Studies in Materials Science and Seismology unique and so promising in terms of potential impact are the innovative interdisciplinary interactions we plan to initiate and nurture between graduate students, postdocs, distinguished visitors and the UCSB researchers," said Carlson.

The goal of the program is to develop new methodologies and, through a visitors' program and the training of students across disciplines, extend these methodologies to the various areas where simulations play a role in the study of earthquakes.

Additional UCSB researchers collaborating in the Keck research program are Ralph Archuleta, professor of geological studies, director of the Institute for Crustal Studies, and UCSB director to the Southern California Earthquake Center; Jacob N. Israelachvili, professor, chemical engineering and materials; James S. Langer, professor of Physics, and David J. Pine, professor of chemical engineering.

The W. M. Keck Foundation is one of the nation's largest philanthropic organizations.

The foundation seeks to enrich research and teaching through support for research projects at the frontiers of science and engineering.

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## **About UC Santa Barbara**

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.