Quantum Materials: the Technological Frontier

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CURRENT RESEARCH

Quantum materials' unique capabilities dramatically shape material properties

Quantum materials are substances in which quantum effects and fluctuations determine the balance between competing states, such as superconductivity, unusual forms of magnetism, and other physical qualities that are just beginning to be understood. Temperature, pressure, and magnetic and electric fields can tune transitions between these phases, with dramatic consequences for material properties. The Rice Center for Quantum Materials (RCQM), located at Rice University, studies the ways that quantum effects can dramatically shape material properties. While quantum materials are of deep, fundamental scientific interest, their incredible properties also have the potential to shape the technologies of the future from wireless devices to new magnetic imaging tools. The unique concentration of expertise within the RCQM makes possible rapid advancement in our scientific understanding and technological development. Through the growth of fundamental research, the Rice Center for Quantum Materials has become a hub for the future of quantum materials.

It is unusual for a single university to have such strong contributors in all aspects of the "materials feedback loop" which includes growth/synthesis/discovery, experimental characterization and modeling, and theoretical treatments with predictive power that help direct the next round of materials synthesis. The RCQM involves 19 faculty researchers and a number of parallel research programs. The Center brings together world-class scientists and engineers, with expertise including materials growth and discovery, theoretical condensed matter physics, quantum chemistry, atomic physics, quantum optics, nanoscience, semiconductor physics, and computational materials. The...

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AFFILIATION

Rice University

EDUCATION

- Ph.D., in Physics, 1998 , Stanford University
- B.S.E., in Mathematical and Aerospace Engineering, 1993 , Princeton University

AWARDS

- E. Morosan, Gordon and Betty Moore Foundation Materials Synthesis Investigator, 2014
- A.H. Nevidomskyy, NSF CAREER and Research Corporation Cottrell Scholar awards, 2014
- P. Dai, Thomson-Reuters, top 3000 most-cited researchers, 2014
- G. Scuseria, Lise Meitner Lectureship Award (Hebrew University), 2014-2015

RESEARCH AREAS

Technology, Materials Science / Physics, Nanotechnology, Semiconductor

FUNDING REQUEST

Your contributions will support the continued research of the Rice Center for Quantum Materials, at Rice University, as the research team develops new quantum materials and advances our theoretical understanding of these amazing systems. Donations will fund personnel, supplies, and specialized measurement hardware. Additionally seminar and visitor programs are particularly helpful for maintaining an active, vigorous center and can be supported for $1K per seminar.