

Department of Applied Physics

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David A. Reis

Associate Professor of Photon Science and of Applied Physics

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Research areas:

Accelerator Physics, AMO Physics, Condensed Matter, Energy Sciences, Laser Physics, Materials Science, Nano Sci/Eng, Photonics, Synchrotron Radiation, Ultrafast Science, X-Ray Physics

Description

Condensed Matter Physics

My research interests include ultrafast processes in the solid state and fundamental light-matter interactions. My group investigates nonequilibrium dynamics in solids with atomic level spatial and temporal resolution. Of particular interest are ultrafast dynamics including electron-phonon and phonon-phonon coupling, coherent phonon dynamics, photo-induced phase transitions, thermal transport and most recently strong-field induced attosecond electron dynamics. Our tools include ultrafast optical laser and x-ray sources (as well as ultrafast x-ray lasers such as the Linac Coherent Light Source x-ray free-electron laser at SLAC).

Lasers and Accelerators

My group makes extensive use of ultrafast lasers and optics and accelerator sources of x-rays in our research.

Nanoscience and Quantum Engineering

Our group studies thermal transport across interfaces of dissimilar materials using ultrafast laser and x-ray probes. Fundamentally these processes occur on the nanoscale involving electron and phonon propagation through thin films and interfaces.

Courses Taught

Solid State Physics I

Selected Publications

Effect of lattice anharmonicity on high-amplitude phonon dynamics in photoexcited bismuth

Atomic-scale visualization of inertial dynamics

Clocking femtosecond x-rays

Ultrafast x-ray scattering in solids

Ultrafast bond softening in bismuth: Mapping a solid's interatomic potential with x-rays

Probing unfolded acoustic phonons with x rays

Thermal transport in a semiconductor heterostructure measured by time-resolved x-ray diffraction

Femtosecond electronic response of atoms to ultra-intense x-rays

Imaging nonequilibrium atomic vibrations with x-ray diffuse scattering

Observation of high-order harmonic generation in a bulk crystal

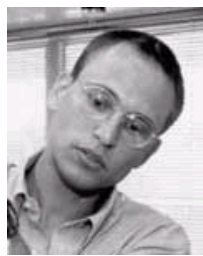
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