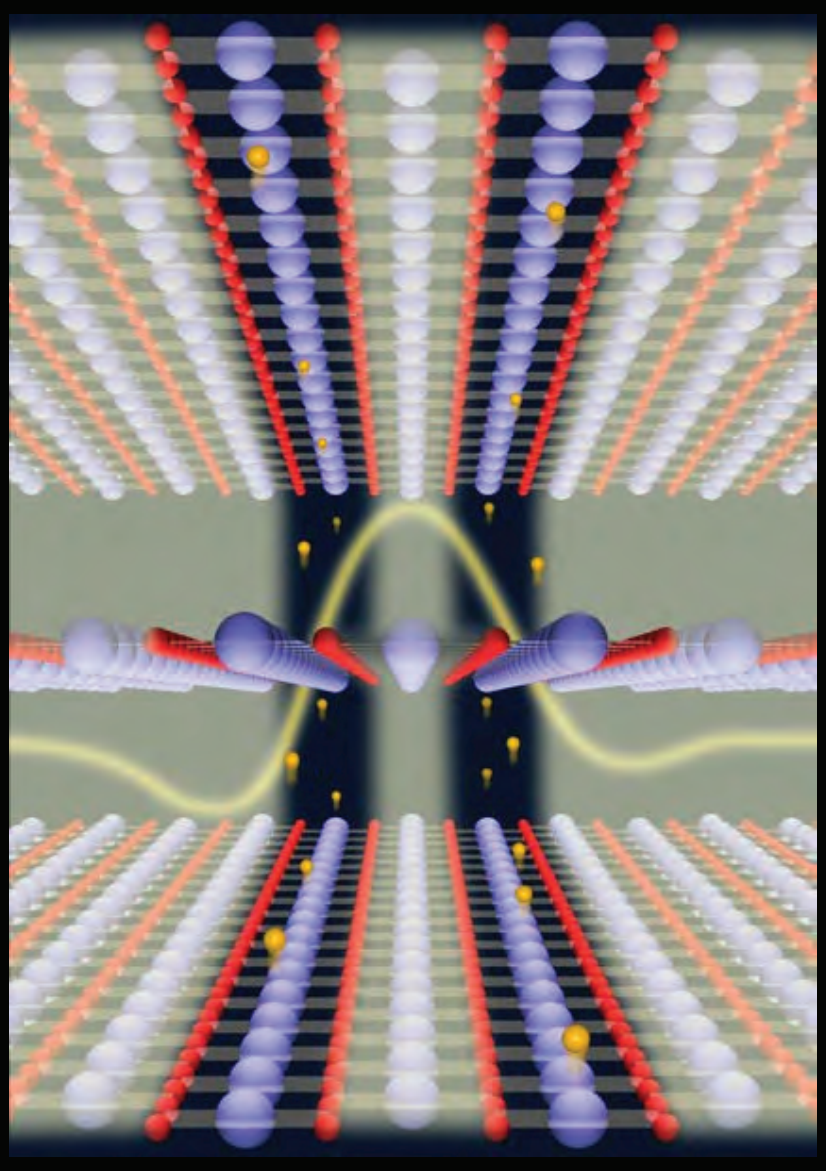
Argonne NATIONAL LABORATORY

Andrea Cavalleri

"Coherent Control of Quantum Matter"

This talk will address some recent work aimed at controlling the low-lying electrodynamics of quantum solids using strong field transients. The excitation of selected vibrational resonances to manipulate the many-body physics of one dimensional Mott Hubbard Insulators and to perturb competing orders in High-Tc superconductors will also be covered. Finally, the speaker will show how the electrodynamics of layered superconductors can be driven through the order-parameter phase gradient, demonstrating ultrafast transistor action in a layered superconductor. Advances in the use of coherent optics, from tabletop sources to THz and x-ray free-electron lasers will also be discussed.

Andrea Cavalleri is recognized as one of the scientists who pioneered the field of photo-induced phase transitions, from the first applications of near-visible light pulses to drive highly correlated electron systems, to the more recent use of nonlinear THz optics to drive lattice vibrations and other low-lying excitations to control quantum states of matter. He has also been a driver in ultrafast x-ray science applications, from the very first femtosecond x-ray plasma sources, to the first slicing source at the Lawrence Berkeley National Laboratory, and free-electron lasers. Cavalleri received a Ph.D. in Electrical Engineering from the University of Pavia, Italy, in 1998, and has held various research positions at the University of Essen, Germany; at the University of California, San Diego; and at the Lawrence Berkeley National Laboratory. In 2005 he joined the faculty of the University of Oxford as a Lecturer, where he was promoted to Professor of Physics in 2006. In 2008 he became a director at the new Max Planck Research Group for Structural Dynamics, where he is currently acting as founding director for the upcoming Max Planck Institute. He is a recipient of the 2004 European Young Investigator Award.



Wednesday, October 5, 2011 | 3:00 p.m.

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