MON2P • Dynamics of Low-Dimensional Systems

Panoramica
10:45–12:30
MON2P • Dynamics of Low-Dimensional Systems
Chair: Michael Wörner, Max-Born-Institute, Berlin, Germany

MON2P.1 • 10:45
Ultrafast Coherent Interactions in Quantum Wells Studied by Two-Dimensional Fourier-Transform Spectroscopy, *Tianhao Zhang[1], Irina Kuznetsova[2], Lijun Yang[3], •Alan Bristow[1], Xingcan Dai[1], Xiaoqin Li[4], Torsten Meier[5], Peter Thomas[2], Shaul Mukamel[3], Richard Mirin[6]*, and *Steven Cundiff[1]*; *[1]JILA, University of Colorado & NIST, Boulder, USA, [2]Department of Physics, Philipps University, Marburg, Germany, [3]Department of Chemistry, University of California, Irvine, USA, [4]Department of Physics, University of Texas, Austin, USA, [5]Department Physik, Universitaet Paderborn, Paderborn, Germany, [6]National Institute of Standards and Technology, Boulder, USA.*
Many-body effects dominate the polarization studies of heavy- and light-hole excitons. Accurate simulations require Coulomb correlations beyond Hartree-Fock approximation. Raman coherences are isolated with a new two-dimensional projection.

MON2P.2 • 11:00
Two-quantum Two-dimensional Fourier Transform Electronic Spectroscopy of Biexcitons in GaAs Quantum Wells, *•Katherine Stone[1], Kenan Gundogdu[1], Daniel Turner[1], Xiaoqin Li[2], Steven Cundiff[3]*, and *Keith Nelson[1]*; *[1]Department of Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA, [2]Department of Physics, University of Texas at Austin, Austin, Texas 78712, USA, [3]JILA, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado 80309, USA.*
Coherent excitonic interactions in GaAs quantum wells are observed by two-quantum two-dimensional Fourier transform electronic spectroscopy. Biexcitonic spectral phase information revealed by this method deconvolves many-body phenomena described by the Hamiltonian for multiple interacting electrons.

MON2P.3 • 11:15
Three-Pulse Echo Peak Shift Spectroscopy of Disordered Semiconductor Quantum Wells and Dense Atomic Vapors, *•Steven Cundiff[1], Virginia Lorenz[1], Sam Carter[1], Zhigang Chen[1], Shaul Mukamel[2]*, and *Wei Zhuang[2]*; *[1]JILA, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado, 80309-0440 USA, [2]Department of Chemistry, University of California, Irvine, Calfornia, 92697-2025 USA.*
Three-pulse echo peak shift spectroscopy yields the correlation function of the frequency fluctuations due to acoustic phonons for excitons in disordered semiconductor quantum wells and fluctuations due to atomic motion in a potassium vapor.

MON2P.4 • 11:30
Teasing a Quasiparticle the Ultrafast Nonlinear Response of the Fröhlich Polaron in GaAs, *•Michael Woerner[1], Peter Gaal[1], Wilhelm Kuehn[1], Klaus Reimann[1], Thomas Elsaesser[1]*, and *Rudolf Hey[2]*; *[1]Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, 12489 Berlin, Germany, [2]Paul-Drude-Institut für Festkörperelektronik, 10117 Berlin, Germany.*
Ultrafast acceleration of polarons in a strong THzfield results in an oscillatory occurrence of midinfrared gain/absorption with the LO phonon frequency. THzpump midinfraredprobe measurements give the first insight into the internal motion of a quasiparticle.

MON2P.5 • 11:45
Coherently controlled ballistic charge currents in unbiased bulk silicon and single-walled carbon nanotubes, *•Markus Betz, Louis Costa, Marko Spasenovic, Ryan W. Newson, Jean-Michel Menard, Christian Sames, Alan D. Bristow*, and *Henry M. van Driel*; *Department of Physics and Institute for Optical Sciences, University of Toronto, Toronto, ON M5S 1A7, Canada.*
Phase-related fundamental and second harmonic femtosecond pulses induce directional charge motion in group IV materials at 300K. THz emission reveals peak current densities of 0.5 kA/cm2 in silicon and currents of 1 nA per nanotube.

MON2P.6 • 12:00
Ultrafast dynamics of coherent phonons in the aligned single-walled carbon nanotubes, *•Keiko Kato[1], Kunie Ishioka[1], Masahiro Kitajima[1], Jie Tang[2]*, and *Hrvoje Petek[3]*; *[1]Advanced Nano-Characterization Center, National Institute for Materials Science, Tsukuba, Ibaraki, Japan, [2]Innovative Materials Engineering Laboratory, National Institute for Materials Science, Tsukuba, Ibaraki, Japan, [3]Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA, USA.*
Sub-10-fs pulses allow real time observation of coherent phonons in aligned bundles of single-walled carbon nanotubes. While electronic excitation is strongly dependent on the axis of carbon nanotubes, G-mode coherent phonons is not.

MON2P.7 • 12:15
Evidence for electron correlation in (6,5) carbon nanotubes from pump-probe spectroscopy with broadband pulses, *•Larry Lüer[1], Jared Crochet[2], Tobias Hertel[2], Dario Polli[3]*, and *Guglielmo Lanzani[3]*; *[1]National Laboratory for Ultrafast and Ultraintense Optical Science, INFM-CNR, Dipartimento di Fisica, Politecnico di Milano, Italy, [2]Department of Physics and Astronomy & Vanderbilt Institute of Nanoscale Science and Engineering (VINSE), Vanderbilt University, 6301 Stevenson Center Lane, Nashville, TN 37235, USA, [3]CNISM and Dipartimento di Fisica, Politecnico di Milano, P.za L. da Vinci 32, 20133 Milano(Italy).*
Pump-probe spectroscopy with 10 fs time resolution is performed on (6,5) carbon nanotubes. We decompose the spectra into contributions from the first and second exciton, demonstrating their electronic correlation.