

HL 38 Invited Talk Meier

Time: Thursday 10:15–11:00

Room: HSZ 01

Invited Talk

HL 38.1 Thu 10:15 HSZ 01

Coherent optical generation and decay of charge and spin currents in semiconductor heterostructures analyzed by microscopic theory — •TORSTEN MEIER¹, QUANG TUYEN VU¹, HUYNH THANH DUC^{1,2}, HARTMUT HAUG³, and STEPHAN W. KOCH¹ — ¹Department of Physics and Material Sciences Center, Philipps University, Renthof 5, D-35032 Marburg — ²Institute of Physics, Mac Dinh Chi 1, Ho Chi Minh City, Vietnam — ³Institut für Theoretische Physik, Johann Wolfgang Goethe-Universität Frankfurt, Max-von-Laue-Strasse 1, D-60438 Frankfurt

The coherent optical injection and temporal decay of spin and charge currents in semiconductor heterostructures is described on a microscopic basis. The approach includes excitonic effects and many-body Coulomb correlations as well as the carrier LO-phonon coupling on the second-order Born-Markov level. Furthermore, the light-field-induced intraband and interband excitations are treated nonperturbatively. Enhanced damping of the spin current relative to the charge current is obtained as a consequence of Coulomb scattering and a nonmonotonic dependence of the currents on the intensities of the two incident laser beams is predicted [1]. Additionally, the influence of memory effects on the coherent transients is investigated [2].

[1] Huynh Thanh Duc, T. Meier, and S.W. Koch, Phys. Rev. Lett. 95, 086606 (2005).

[2] Q.T. Vu, Huynh Thanh Duc, T. Meier, H. Haug, and S.W. Koch, unpublished.