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Time-dependent Kohn-Sham theory with memory HARSHANI O. WIJEWARDANE, CARSTEN A. ULLRICH, Department of Physics, University of Missouri — In time-dependent density-functional theory, exchange and correlation (xc) beyond the adiabatic local density approximation can be described in terms of viscoelastic stresses in the electron liquid. In the time domain, this leads to a velocity-dependent xc vector potential with a memory containing short- and long-range components. The resulting time-dependent Kohn-Sham formalism describes the dynamics of electronic systems including decoherence and relaxation. For the example of collective charge-density oscillations in a quantum well, we illustrate the xc memory effects, clarify the dissipation mechanism, extract intersubband relaxation rates for weak and strong excitations, and demonstrate the generation of plasmon sidebands. This work was supported by the ACS Petroleum Research Fund and Research Corporation.

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