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Memory and exact exchange in time-dependent density-functional theory[1] HARSHANI O. WIJEWARDANE, CARSTEN A. ULLRICH, Department of Physics and Astronomy, University of Missouri-Columbia — Most applications in time-dependent density-functional theory (TDDFT) are being carried out using adiabatic approximations, such as the ALDA, for the exchange-correlation potential $V_{\rm xc}(r,t)$ at time t. In these approximations, the previous history of the system at times $t' < t$ is ignored in constructing $V_{xc}(r,t)$. In this talk, we consider the exact exchange potential in TDDFT and show that it has a memory. The exact exchange potential is obtained from the time-dependent optimized effective potential (TDOEP) method. We solve the associated TDOEP integral equation in space and time for a quantum well with two occupied subbands. We compare exact results with the KLI, Slater and ALDA approximations, discussing the memory effects and their relation to the elasticity of the electron liquid.

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