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Real-time dynamics of particle-hole excitations in Mott insulator-metal junctions[1] LUIS DIAS DA SILVA, Oak Ridge Natl. Laboratory (ORNL) and Univ. of Tennessee (UT), KHALED AL-HASSANIEH, Los Alamos National Laboratory, ADRIAN FEIGUIN, University of Wyoming, FERNANDO REBOREDO, ORNL, ELBIO DAGOTTO, ORNL/UT — Charge excitations in Mott insulators (MIs) are distinct from their band-insulator counterparts and can provide a mechanism for energy harvesting in solar cells based on strongly correlated materials. In this work [1], we study the real-time dynamics of a holon-doublon pair in a 1D Hubbard model (a prototypical example of a MI) connected to metallic leads using the time-dependent density matrix renormalization group (tdDMRG) method. Doublons and holons scatter off the MI-metal boundaries on opposite sides, leading to an effective charge transfer into the leads. This charge transfer is strongly affected by the electron-electron correlations in the MI and is nonzero even in the case of charge balance between the leads, in contrast to the case of a band insulator-metal junction. Moreover, the propagation of holon-doublon excitations dynamically changes the spin-spin correlations within the MI, introducing time-dependent phase shifts in the spin structure factor.

[1] L. Dias da Silva et al., arXiv:0911.2141. See also K.A. Al-Hassanieh et al., PRL **100** 166403 (2008).

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