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**Excitons in the 1D Hubbard Model: a Real-Time Study** KHALED AL-HASSANIEH, Los Alamos National Laboratory, ADRIAN FEIGUIN, The University of Maryland, FERNANDO REBOREDO, IVAN GONZALEZ, ELBIO DAGOTTO, Oak Ridge National Laboratory — We study the real-time dynamics of a pair hole/doubly-occupied-site, namely a holon and a doublon, in a 1D Hubbard insulator with on-site and nearest-neighbor Coulomb repulsion. Our analysis shows that the pair is long-lived and the expected decay mechanism to underlying spin excitations is actually inefficient. For a nonzero inter-site Coulomb repulsion, we observe that part of the wave-function remains in a bound state. Our study also provides insight on the holon-doublon propagation in real space. Due to the one-dimensional nature of the problem, these particles move in opposite directions even in the absence of an applied electric field. The potential relevance of our results to solar cell applications is discussed.

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