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Quantum Dynamics of Solitons in Strongly Interacting Systems on Optical Lattices CHESTER RUBBO, JILA, RADHA BALAKRISHNAN, The Institute of Mathematical Sciences, WILLIAM REINHARDT, University of Washington, Seattle, INDUBALA SATIJA, Joint Quantum Institue, NIST, ANA REY, SALVATORE MANMANA, JILA — We present results of the quantum dynamics of solitons in XXZ spin-1/2 systems which in general can be derived from a system of spinless fermions or hard-core bosons (HCB) with nearest neighbor interaction on a lattice. A mean-field treatment using spin-coherent states revealed analytic solutions of both bright and dark solitons [1]. We take these solutions and apply a full quantum evolution using the adaptive time-dependent density matrix renormalization group method (adaptive t-DMRG), which takes into account the effect of strong correlations. We use local spin observables, correlations functions, and entanglement entropies as measures for the stability of these soliton solutions over the simulation times.

[1] R. Balakrishnan, I.I. Satija, and C.W. Clark, Phys. Rev. Lett. **103**, 230403 (2009).

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