

Abstract Submitted
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Impurity driven diffusion and destruction of solitons in quasi-1D Bose-Einstein condensates LAUREN AYCOCK, Cornell University/ Joint Quantum Institute, HILARY HURST, HSIN-I LU, DINA GENKINA, University of Maryland College Park/ Joint Quantum Institute, IAN SPIELMAN, Joint Quantum Institute/National Institute of Standards and Technology/University of Maryland — Current experimental research on solitons focuses on their collisions with each other and how dimensionality influences their stability and decay. Here, we investigate the effect of evenly distributed impurity atoms on soliton dynamics. We launch lone, long-lived solitons in highly elongated ^{87}Rb Bose-Einstein condensates (BECs) by phase imprinting and observe oscillations stable over many seconds. We compare these long-lived solitons to those launched in BECs containing a few percent of impurity—the same atomic species in a different Zeeman sublevel—controllably introduced just before evaporation to degeneracy. These impurities – evenly distributed throughout the condensate – dramatically decrease the soliton lifetime and enhance Brownian-like diffusion in the soliton’s trajectory.

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