

Abstract Submitted
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Experimental and Numerical Study of Bright Matter- Wave Soliton Collisions¹ H. LUO, J.H.V. NGUYEN, P. DYKE, R.G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University — We create pairs of bright matter-wave solitons from Bose-Einstein condensates of ^7Li atoms by tuning the scattering length to a negative value. We examine the collision of a pair of solitons formed in a quasi-1-D harmonic trap as a function of their relative phase. While the solitons pass through one another without change in shape or amplitude, they nonetheless exhibit an effective interaction that can be either repulsive or attractive depending on their relative phase. Furthermore, we observe a discontinuous jump in the soliton motion that causes the dipole mode oscillation frequency to shift to values greater than the trap frequency. The result is compared to numerical solution of the 3-D Gross-Pitaevskii equation.

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