

Abstract Submitted
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Solitons and Breathers in Strongly Repulsive Bose-Einstein Condensates WILLIAM REINHARDT, University of Washington, Seattle, INDUBALA SATIJA, George Mason University, BRYCE ROBBINS, Colorado School of Mines, CHARLES CLARK, Joint Quantum Insititue, National Insitute of Standard and Technology — Collisional dynamics of solitary matter waves of hard core bosons, consisting of dark and bright waves as well as supersonic periodic trains, reveals remarkable richness and coherence, with the phase of the condensate playing a key role. Depending upon the condensate density, we see two distinctive effects in the collision of these waves: intuitively expected repulsive collision due to hard core boson constraint and also collisions in which they “pass through” each other without distortion. In addition to confirming the soliton status of the solitary waves, our studies reveal a variety of multi-solitons including a family of breathers, that can be demonstrated in an optical lattice with appropriate phase imprinting.

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