Abstract Submitted
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Observation of interparticle interaction effects in a Bose-Einstein condensate confined in a 1D optical lattice[1] THOMAS BERSANO, SEAN MOSSMAN, PETER ENGELS, Washington State University, QINGZE GUAN, DOERTE BLUME, The University of Oklahoma — Ultracold atoms in optical lattices provide a versatile analogue for solid-state systems and are also of practical interest for atom interferometry and precision measurements. While in many cases the single-particle band structure is well understood, unexpected or even counterintuitive behavior of the system can arise when the lattice depth decreases and becomes comparable to the mean-field interactions. The system then enters a highly nonlinear regime, which adds complexity to determining the lattice depth experimentally and can give rise to loop structures in the dispersion. We demonstrate nonlinear effects in a Bose-Einstein condensate in a 1D optical lattice where the mean-field energy is on the order of the lattice coupling strength by observing the results of Rabi oscillations and Bloch oscillations in the system. The current status and future directions of this work are discussed.

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