

Abstract Submitted  
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**Two-component Bosons in State-Dependent Optical Lattices<sup>1</sup>**

DANIEL PERTOT, BRYCE GADWAY, RENÉ REIMANN<sup>2</sup>, BARTOSZ BOGUCKI, DOMINIK SCHNEBLE, Stony Brook University — Ultracold bosonic mixtures in combination with state-dependent optical lattices offer the possibility to experimentally investigate idealized models of condensed matter physics. Among them are spin-boson models or the two-component Bose-Hubbard model, which reduces to the anisotropic (XXZ) Heisenberg model in the limit of weak hopping and unit occupancy. Here, we report on experiments with mixtures of  $^{87}\text{Rb}$  in two different hyperfine states in a state-dependent optical lattice potential. We demonstrate atomic four-wave mixing of two-component matter waves and present results on interspecies interaction effects in the two-component Bose-Hubbard model, along with a discussion of recent experimental progress.

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