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Implementing the single-species two-component Bose-Hubbard model in an optical lattice BRYCE GADWAY, DANIEL PERTOT, RENE REIMANN, BARTOSZ BOGUCKI, DOMINIK SCHNEBLE, SUNY Stony Brook — The two-component Bose-Hubbard model exhibits interesting quantum phases, and mimics an anisotropic Heisenberg model for quantum magnetism in the limit of weak hopping and unit occupancy. It can be realized by using two different hyperfine states of a single species of ultracold bosonic atoms trapped in a state-dependent optical lattice. For the production of ^{87}Rb Bose-Einstein condensates we employ a moving-coil transporter apparatus including a TOP trap that serves as a "funnel" to load pre-cooled thermal atoms into a crossed optical dipole trap, where the actual condensation takes place. A three-dimensional optical lattice is then superimposed onto the optically trapped BEC. We present our current work regarding the preparation of a clean Mott insulator state, the control of hyperfine states, and the implementation of a state-dependent lattice.

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