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Towards studying quantum spin systems with ultracold bosons in an optical lattice DANIEL PERTOT, BRYCE GADWAY, RENE REIMANN, DOMINIK SCHNEBLE, SUNY Stony Brook — We report on our progress towards the realization of the two-component Bose-Hubbard model using single-species ultracold bosonic atoms in a hyperfine state-dependent optical lattice. In the limit of weak hopping and unit occupancy, the two-component Bose-Hubbard model effectively mimics the spin-1/2 XXZ Heisenberg model, which is a well-known model system in quantum magnetism. Further, the two-component Bose-Hubbard model on its own might exhibit interesting low-temperature phases. We produce Bose-Einstein condensates of ^{87}Rb with a moving-coil transporter apparatus including a TOP trap which serves as a "funnel" to load a crossed optical dipole trap, where the actual condensation followed by the ramp-up of the lattice takes place. Our current work regarding the preparation of a clean Mott insulator state and the implementation of the state-dependent lattice will be discussed.

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