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Isentropes of spin-1 bosons in an optical lattice KHAN W. MAHMUD, University of California, Davis, GEORGE G. BATROUNI, University of Nice, RICHARD T. SCALETTAR, University of California, Davis — We study the effects of adiabatic ramping of optical lattices on the temperature of spin-1 bosons in a homogeneous lattice. Using mean-field theory, we present the isentropes in the temperature-interaction strength (T, U_0) plane for ferromagnetic, antiferromagnetic, and zero spin couplings. Following the isentropic lines, temperature changes can be determined during adiabatic loading of current experiments. We show that the heating-cooling separatrix lies on the superfluid-Mott phase boundary with cooling occuring within the superfluid and heating in the Mott insulator, and quantify the effects of spin coupling on the heating rate. We find that the mean-field isentropes for low initial entropy terminate at the superfluid-Mott insulator phase boundary.

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