A numerical study of the phase diagram and dynamics of spin 1 bosons in a one dimensional optical lattice SUBROTO MUKERJEE, FRANK POLLMANN, JOEL MOORE, University of California, Berkeley — We study the phase diagram and dynamics of spin 1 bosons in a one dimensional optical lattice using iTEBD (inifinite Time Evolved Block Decimation), a numerical technique that allows us to perform calculations in the thermodynamic limit. We compare our results with previous numerical work on these systems using the conventional DMRG (Density Matrix Renormalization Group) technique and analytic calculations based on the non-linear sigma model. We also investigate the possibility of the existence of a condensate of paired singlets, a Mott insulator with dimer order and a supersolid phase between the two. Our numerical technique allows us to efficiently calculate various dynamical properties of these phases to shed light on the nature of excitations. In particular, we do this for the case of one boson per site and strong interactions when the model can be mapped on to the dimerized phase of the spin-1 Heisenberg chain.

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