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Dynamics of Quantum Phase Transitions and the Kibble-Zurek Mechanism[1] JENNIFER PATTERSON, MICHAEL WALL, LINCOLN CARR, Colorado School of Mines — We study the dynamics of quantum phase transitions (QPT's) for a system of spin-1 bosons on an optical lattice described by a bilinear-biquadratic spin Hamiltonian. We modify the system with an externally controllable quadratic Zeeman effect, which yields a rich phase diagram. We generate the phase diagram and simulate the dynamics of QPT's using time-evolving block decimation – a matrix product state numerical method. Of particular interest are the finite size effects in the gapless to gapless transition that occurs in one dimension between the XY nematic phase and the Dimer nematic phase. From the entanglement entropy, we compute the critical exponents for the Ising-type transition from Ising nematic to Dimer nematic phases. We quench to criticality to observe pure Kibble-Zurek effects.

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