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Time reversal symmetry breaking of p-orbital bosons in a one-dimensional optical lattice[1] XIAOPENG LI, ZIXU ZHANG, W. VINCENT LIU, University of Pittsburgh — We study bosons loaded in a one-dimensional optical lattice of two-fold p-orbital degeneracy at each site. Our numerical simulations find an anti-ferro-orbital p_x+ip_y, a homogeneous p_x Mott insulator phase and two kinds of superfluid phases distinguished by the orbital order (anti-ferro-orbital and para-orbital). The anti-ferro-orbital order breaks time reversal symmetry. Experimentally observable evidence is predicted for the phase transition between the two different superfluid phases. We also discover that the quantum noise measurement is able to provide a concrete evidence of time reversal symmetry breaking in the first Mott phase.

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