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Quantum phases and phase transitions in bosonic mixtures induced by non-s-wave Feschbach resonances in optical lattices[1] ANATOLY KUKLOV, CSI, CUNY — Feschbach resonance at finite angular momentum in a mixture of distinguishable bosons in optical lattice (OL) can induce quantum phase transitions (QPTs) into states which break OL symmetries and time reversal. In particular, a two-component mixture, with one component being superfluid and the other Mott insulator, can undergo QPT into, e.g., p-wave condensate characterized by lines of zeros, spontaneous currents and by strong quantum depletion [2]. The ground state is sensitive to rotation of OL. Analogously, a featureless two-component Mott insulator can undergo QPT into the insulator with broken lattice symmetries. While impossible for an absolute ground state, such effect can be realized in the context of metastable phases generic for atomic traps and OLs as long as there is a large energy difference between the resonance and true molecular ground state. A condition for such transition is that the closed-open channels coupling exceeds the onsite excitation energy in the regime of weak tunneling between sites. Standard imaging techniques can be used to identify such phases.

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