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Stabilization of the p-wave superfluid state in an optical lattice YANG-HAO CHAN, YONG-JIAN HAN, WEI YI, ANDREW DALEY, SEBASTIAN DIEHL, PETER ZOLLER, LUMING DUAN, DEPARTMENT OF PHYSICS AND MCTP, UNIV. OF MICHIGAN COLLABORATION, INSTITUTE FOR QUANTUM OPTICS AND QUANTUM INFORMATION OF THE AUSTRIAN ACADEMY OF SCIENCES, AUSTRIA COLLABORATION — It is hard to stabilize the p-wave superfluid state of cold atomic gas in free space due to inelastic collisional losses. We consider the p-wave Feshbach resonance in an optical lattice, and show that it is possible to have a stable p-wave superfluid state where the multi-atom collisional loss is suppressed through the quantum Zeno effect. We derive the effective Hamiltonian for this system, and calculate its phase diagram in a one-dimensional optical lattice. The results show rich phase transitions between the p-wave superfluid state and different types of insulator states induced either by interaction or by dissipation.

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