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Repulsive polarons in alkaline-earth(-like) atoms across an orbital Feshbach resonance TIAN-SHU DENG, Key Laboratory of Quantum Information, University of Science and Technology of China,, ZHUO-CHENG LU, YUE-RAN SHI, JIN-GE CHEN, WEI ZHANG, Department of Physics, Renmin University of China, WEI YI, Key Laboratory of Quantum Information, University of Science and Technology of China, — We characterize properties of the so-called repulsive polaron across the recently discovered orbital Feshbach resonance in alkaline-earth(-like) atoms. Being a metastable quasiparticle excitation at the positive energy, the repulsive polaron is induced by the interaction between an impurity atom and a Fermi sea. By analyzing in detail the energy, the polaron residue, the effective mass, and the decay rate of the repulsive polaron, we reveal interesting features that are uniquely related to the two-channel nature of the orbital Feshbach resonance. In particular, we demonstrate that the life time of the repulsive polaron is non-monotonic in the Zeeman-field detuning bewteen the two channels, and has a maximum on the BEC-side of the resonance. By considering the stability of a mixture of the impurity and the majority atoms against phase separation, we show that the itinerant ferromagnetism may exist near the orbital Feshbach resonance at large atomic densities. Our results can be readily probed experimentally, and have interesting implications for the observation of itinerant ferromagnetism near an orbital Feshbach resonance.

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