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Superconductivity in a two-dimensional repulsive Rashba gas at low density LUYANG WANG, HONG YAO, Institute for Advanced Study, Tsinghua University — We study the superconducting instability and the resulting superconducting states in a two-dimensional repulsive Fermi gas with Rashba spin-orbit coupling at low electron density. We find that the superconductivity is enhanced as the Fermi energy E_F decreases, due to two reasons: first, the density of states at E_F increases as $1/\sqrt{E_F}$; second, the particle-hole bubble gains a more magnificent structure, resulting in an increasing effective attraction. The superconducting state is always in the total angular momentum $j_z = \pm 2$-channel, and breaks time-reversal symmetry. Once a sufficiently large Zeeman coupling is applied to the superconducting state, the spectrum Chern number becomes ± 1, depending on the direction of the Zeeman field, and Majorana zero modes appear in the vortex cores. Collective modes in this superconducting state are also studied.

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