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Effective field theory approach to the p-wave spin-triplet Fermi superfluid[1] KEISUKE FUJII, YUSUKE NISHIDA, Department of Physics, Tokyo Institute of Technology — The low-energy physics of a fully gapped Fermi superfluid is governed by Nambu-Goldstone bosons resulting from its spontaneous symmetry breaking. Here we construct an effective field theory of the Balian-Werthamer state, which is one of the p-wave spin-triplet superfluid state. The effective field theory is constructed up to the next-to-leading order in a derivative expansion, so as to be consistent with all available symmetries in curved space, which are the $\mathrm{U}(1)_{\mathrm{phase}} \times \mathrm{SU}(2)_{\mathrm{spin}} \times \mathrm{SO}(3)_{\mathrm{orbital}}$ gauge invariance and the nonrelativistic general coordinate invariance. The obtained low-energy effective field theory is capable of predicting gyromagnetic responses of the Balian-Werthamer state, such as a magnetization generated by a rotation and an orbital angular momentum generated by a magnetic field, in a model-independent and nonperturbative way. We furthermore show that the stress tensor exhibits a dissipationless Hall viscosity with coefficients uniquely fixed by the orbital angular momentum.

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