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Orbital magnetic moment in the chiral p-wave superconductor Sr2RuO4 JAMES ANNETT, University of Bristol,, KAROL WYSOKINSKI, M. Curie Sklodowska University, BALAZS GYORFFY, University of Bristol — The existence and magnitude of a bulk orbital angular momentum of the condensate chiral a phase in superfluid helium-3 is a longstanding matter of controversy. The analogous problem in a chiral p-wave superconducting material is the existence of a finite orbital magnetic moment in the bulk. In Sr2RuO4 the existence of such an orbital moment is strongly suggested by experimental evidence for spontaneously time reversal symmetry breaking (TRSB) in the superconducting state, but the theories disagree on the expected magnitude of this moment. We show that a non-zero orbital magnetization density arises natually in a realistic band model for Sr2RuO4, and its temperature dependence is qualitatively similar to those of the muSr and Kerr effect experimental results. The simplest model which leads to the orbital moment requires at minimum two degenerate atomic orbitals per Ru, which correspond to the Ru d xz and d yz states. This is in contrast to the theories of orbital angular momentum in the isotropic superfluid 3-He, or models of orbital moment in Sr2RuO4 which assume only a single band at the Fermi level. The implications of this surprising result are explored.

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