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Spin-Orbit Coupling and Symmetry of the Order Parameter in Strontium Ruthenate JAMES ANNETT, University of Bristol, UK, GRZEGORZ LITAK, Technical University of Lublin, BALAZS GYORFFY, University of Bristol, KAROL WYSOKINSKI, M. Curie Sklodowska University — Determination of the orbital symmetry of the pairing state in the spin triplet superconductor Sr_2RuO_4 is a challenge of considerable importance. Most of the experiments show that a chiral state of the $\hat{z}(k_x \pm ik_y)$ type is realized and remains stable on lowering the temperature. Here we have studied the stability of various superconducting states of Sr_2RuO_4 in the presence of spin-orbit coupling. Numerically we found that the chiral state is never the minimum energy. Alone among the five states studied it has $< \hat{\mathbf{L}}.\hat{\mathbf{S}} >= 0$ and is therefore not affected to linear order in the coupling parameter λ. We found that stability of the chiral state requires spin dependent pairing interactions. This imposes a strong constraint on the pairing mechanism.

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