

The chiral p -wave state in Sr_2RuO_4

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There is growing evidence that in Sr_2RuO_4 superconductivity with chiral p -wave (spin-triplet) symmetry is realized. The most important experimental data for this conclusion are reviewed here. The microscopic mechanism for this pairing state is still unclear. Among the possible spin-triplet pairing states there are six competing candidates. We argue that the chiral p -wave state might be favored due to spin-orbit coupling effects based on our calculation. The chiral p -wave state displays interesting magnetic properties which originate from chiral boundary states. The role of these boundary states is also analyzed in the context of the spontaneous Hall effect expected in a chiral p -wave states. We compared this phenomenon with the Quantum Hall effect with which it shares certain features.

KEYWORDS: Sr_2RuO_4 , p -wave superconductor, unitary state, time-reversal breaking state, B-dG equation