Spin triplet superconductivity in Sr_2RuO_4

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9.7 cm

Sr_2RuO_4 is at present the best candidate of the solid state superconducting analogue of the triplet superfluidity in ^{3}He. The material is a good (albeit correlated) Fermi liquid in the normal state and an exotic superconductor below T_c. The mechanism of superconductivity and symmetry of the order parameter remain main puzzling issues of on-going research. In the talk I shall present the results of our search for the correct superconducting state realised in the material. Our calculations are based on a three-dimensional three-band effective model with a realistic band structure. We have found a state with non-zero order parameter at each of the three sheets of the Fermi surface. The corresponding gap in the quasiparticle spectrum has line or point nodes on the α and β sheets and is complex with no nodes at the γ sheet. This state describes remarkably well a number of existing experiments including power low temperature dependence of the specific heat, penetration depth, thermal conductivity etc. The stability of the state with respect to disorder and spin-orbit coupling will be also briefly analysed.

13.4 cm

Subject category :

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