

## Electronic theory for superconductivity in Sr<sub>2</sub>RuO<sub>4</sub>: Triplet pairing due to spin-fluctuation exchange

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### Abstract

Using a Hubbard Hamiltonian for the three electronic bands crossing the Fermi level in Sr<sub>2</sub>RuO<sub>4</sub>, we calculate the band structure and spin susceptibility  $\chi(q, w)$  in quantitative agreement with nuclear magnetic resonance (NMR) and inelastic neutron scattering (INS) experiments. The susceptibility has two peaks at  $Q_i = (2\pi/3a, 2\pi/3a, 0)$  due to the nesting Fermi surface properties and at  $q_i = (0.2\pi/a, 0, 0)$  due to the tendency towards ferromagnetism. Applying spin-fluctuation exchange theory as in layered cuprates we determine from  $\chi(q, w)$ , electronic dispersions, and Fermi surface topology that superconductivity in Sr<sub>2</sub>RuO<sub>4</sub> consists of triplet pairing. Using  $X(q, w)$  we can exclude s- and d-wave symmetry for the superconducting order parameter. Furthermore, within our analysis and approximations we find that the order parameter will have a node between neighboring RuO<sub>2</sub>-planes and that in the RuO<sub>2</sub>-plane  $fx^2 - y^2$ -wave and p-wave symmetry are close in energy.

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