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Structure of spin-fluctuations and symmetry of the order parameter in unconventional Sr_2RuO_4 superconductor. S. KHMELEVSKYI, Vienna University of Technology, IAP, CMS, I. I. MAZIN, BONGJAE KIM, Naval Research Laboratory, D. F. AGTERBERG, University of Wisconsin, C. FRANCHINI, Vienna University, CMP — The superconductivity (SC) in the Sr2RuO4 has attracted a considerable interest comparable to that in cuprates and iron pnictides due to the presumed triplet character of the SC order parameter (OP) and spin-fluctuations (SF) mechanism of the electron pairing. Early NMR experiments suggested a triplet chiral OP, while recent probes of strained crystals point toward singlet pairing. Interpretation of the NMR data relies upon the idea that the order parameter vector rotates in an external field of ˜200 Oe. In this work we explore the paramagnetic SF in the Sr_2RuO_4 from first principles by calculating effective exchange interactions in disordered local moment state. We find that long-range interactions lead to the competition of several magnetic ground states with wave vectors close to the experimentally observed. The degeneration is removed only by SOC and a very special collinear modulated magnetic structure stabilizes. We derive the isotropic and anisotropic exchange terms and a single-site magnetic anisotropy, and show that these terms provide an energy penalty for rotating the order parameter that is several orders of magnitude too large, thus rendering the NMR experiment completely inexplicable in terms of the conventional theory. Instead, we write down an effective anisotropic double-exchange model based on our calculated parameters.

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