

Kerr effect in the spin-singlet chiral superconducting state of Sr_2RuO_4

James F. Annett^{1,*} and Karol I. Wysokiński^{2,**}

¹H. H. Wills Physics Laboratory, University of Bristol, Royal Fort, Tyndall Avenue, Bristol BS8 1TL, United Kingdom

²Institute of Physics, M. Curie-Skłodowska University, pl. M. Curie-Skłodowskiej 1, 20-031 Lublin, Poland

*james.annett@bristol.ac.uk

**kiwysokinski@gmail.com

Strontium ruthenate is an interesting low temperature superconductor with relatively simple normal state and very puzzling superconducting properties [1]. Despite over thirty years of intensive research, even the precise symmetry of the order parameter is not known. The material was considered as being an example of spin-triplet odd-parity superconductor, *i.e.* the solid state analogue of ^3He superfluid. The novel, more careful, measurement of the Kerr effect [2] has challenged the spin-triplet character of strontium ruthenate.

Since Sr_2RuO_4 now appears most probably a spin singlet, chiral time-reversal symmetry breaking superconductor we have repeated our own calculations of the Kerr effect [3] for one candidate *d*-wave pairing state. We find [4] that for the chiral *d*-wave E_g pairing state the calculated Hall conductance is non-zero and qualitatively similar to that found earlier under the assumption of a chiral p-wave E_u order parameter. We characterize the Hall conductance in relation to two sum rules, one related to Berry curvatures in the Bogoliubov quasiparticle states, and the other *f*-sum rule indicating the presence of inter-orbital pairing.

Acknowledgments *This work has been partially supported by the National Science Center, Poland (“Weave” programme) through grant no. 2022/04/Y/ST3/00061.*

References

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