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Large Chern Number and Edge Currents in Sr2RuO4 THOMAS SCAFFIDI, STEVEN SIMON, University of Oxford — Using the results of a previously reported microscopic calculation, we show that the most favored chiral superconducting order parameter in Sr_2RuO_4 has Chern number $|C| = 7$ in the weak coupling limit. This order parameter has a momentum dependence of the type $\sin(k_x)\cos(k_y) + i\sin(k_y)\cos(k_x)$ and lies in the same irreducible representation E_u of the tetragonal point group as the usually assumed gap function $\sin(k_x) + i\sin(k_y)$. While the latter gap function leads to $C = 1$, the former leads to $C = -7$, which is also allowed for an E_u gap function since the tetragonal symmetry only fixes C modulo 4. Since it was shown that the edge currents of a $|C| > 1$ superconductor vanish exactly in the continuum limit, and can be strongly reduced on the lattice, this form of order parameter could help resolve the conflict between experimental observation of time-reversal symmetry breaking and yet the absence of observed edge currents in Sr_2RuO_4.

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