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POS-F52 – Theoretical study of strain and superconductivity in Sr₂IrO₄

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Several parallels can be drawn between the perovskite iridate Sr₂IrO₄, and the high T_c cuprates. Although the low energy spectrum of Sr₂IrO₄ includes the three t_{2g} bands, strong spin-orbit coupling splits the bands such that one can write an effective one-orbital J=1/2 model, in analogy with the single orbital of the cuprates. This has led to predictions of d-wave superconductivity in Sr₂IrO₄ upon electron doping. A three-orbital Hubbard model finds that the pairing is dependent on the interorbital interactions, therefore, an effective one orbital model may be insufficient in describing the superconducting state. In this work we investigate the multiorbital properties of Sr₂IrO₄, both with and without doping, under compressive epitaxial strain. Strain modifies lattice constants and bond orientations. The strain is modeled by modifying the orbital dependent hopping amplitudes and can therefore tune the bandwidths of the different bands. By applying a multiple order parameter, self-consistent mean-field approach we study the magnetic structure and pairing symmetry of Sr₂IrO₄ under strain and carrier doping. We comment on ways to increase the chance of superconductivity.

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