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Strongly correlated Dirac electrons and f-wave superconductivity in Ga- herbertsmithite IGOR MAZIN, Naval Research Lab, HARALD JESCHKE, Institut für Theoretische Physik, Goethe-Universität Frankfurt, FRANK LECHERMANN, I. Institut für Theoretische Physik, Universität Hamburg, HUN-PYO LEE, Institut für Theoretische Physik, Goethe-Universität Frankfurt, MARIO FINK, RONNY THOMALE, Theoretische Physik I, Universität Würzburg, ROSER VALENTÍ, Institut für Theoretische Physik, Goethe-Universität Frankfurt — Herbertsmithite $ZnCu_3(OH)_6C_{12}$ is essentially the only real-world realization of the ideal single-orbital Kagome model. Being half-doping, it is a Mott insulator. In the nn $p-d$ TB model, it maps exactly onto a single s-orbital Kagome Hamiltonian, in particular, exhibits topologically protected Dirac points (DP) at the 4/3 doping. We propose to achieve this doping by substituting Ga for Zn. Such Ga-herbertsmithite (GHS) would be a rare example of a material with strongly correlated Dirac electrons at symmetry-protected locations in the Brillouin zone. We have investigated GHS by means of DFT, TB-DCA and the Slave Bosons approaches and searched for Mott and/or charge order instabilities, and found that it remains metallic and uniform, retaining the DPs. Such a metal with strongly correlated DP electrons would have rather unique topological, magnetic and transport properties. In particular, we show analytically and using fRG that when back-doped with Zn, GHS would harbor unconventional spin-fluctuation driven superconductivity which by symmetry must be f-wave of the $+-+-+-$ type.

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