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Exotic magnetism of Jeff=1/2 iso-spins in complex Ir oxides[1]

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In 5d Iridium oxides, a large spin-orbit coupling of $\sim$ 0.5 eV, inherent to heavy 5d elements, is not small as compared with other relevant electronic parameters including Coulomb U, transfer t and crystal field splitting D, which gives rise to a variety of exotic magnetic ground states. In the layered perovskite Sr_2IrO_4, spin-orbital Mott state with Jeff=1/2 is realized due to the novel interplay of those energy scales [1, 2]. Despite the strong entanglement of spin and orbital degrees of freedom, surprisingly isotropic, two-dimensional Heisenberg character of $J_{\rm eff}$ =1/2 iso-spins was observed in Sr_2IrO_4 with 180 deg Ir-O-Ir bonds, by the recent resonant magnetic x-ray diffuse scattering and the magnetic susceptibility measurements [3]. Complex Na-Ir oxides with honeycomb and more recently identified *hyper-honeycomb* lattices, where 90 deg Ir-O-Ir bonds are realized, are candidates for Kitaev spin liquid. Such exotic magnetism was recently shown to be tailored using super-lattice structure [4] In this talk, we review these unique magnetic phases in Ir oxides.

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