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# Magnetic structure of the frustrated fcc iridate (NH4)2IrCl6: A candidate J_eff=1/2 Mott insulator

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Magnetic materials containing octahedrally coordinated $Ir^{4+}$ ions can give rise **novel $J_{eff}=\frac{1}{2}$ magnetic moments** due to the interplay of **strong spin-orbit coupling**, onsite Coulomb repulsion and crystalline electric field. The exchange interaction between such moments depends on the geometry of the exchange paths between the magnetic ions and could be **highly anisotropic** such as the **Kitaev exchange** in 2D honeycomb lattice. This could lead to a rich variety of magnetic ground states with **exotic excitation** as has been proposed theoretically and also observed experimentally in several real materials. $(NH_4)_2IrCl_6$ retains its cubic symmetry (fcc) down to very low temperatures and offer best possible condition for the cubic crystalline electric field to realize genuine $J_{eff}=\frac{1}{2}$ state. The crystal and magnetic structures of the $(NH_4)_2IrCl_6$ single crystal have been studied using neutron diffraction, synchrotron X-ray diffraction and resonant inelastic X-ray scattering techniques. The study shows that the interplay of geometrical frustration and the bond dependent exchange frustration stabilizes a type-III collinear AFM ordering at $T_N$=2.1 K with propagation vector (1 $\frac{1}{2}$ 0). Thus **the bond dependent Kitaev interaction in the fcc lattice may oppose the magnetic frustration** which is in sharp contrast to the Kiteav interaction in honeycomb lattices promoting quantum spin-liquid ground states.

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