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(I) Exploring Kitaev Magnetism Beyond the Honeycomb Lattice

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The properties of heavy 5d transition metal oxides, such as iridates and osmates, are often remarkably different from those of their lighter 3d counterparts. In particular, the presence of strong spin-orbit coupling (SOC) in these compounds can give rise to a variety of exotic quantum states, including spin-orbital Mott insulators, topological insulators, Weyl semimetals, and quantum spin liquids. In materials based on edge-sharing octahedral crystal structures, large SOC can also lead to unconventional magnetism, and a form of highly anisotropic, bond-directional Ising interaction known as the Kitaev interaction. The first, and best known, experimental realizations of Kitaev magnetism are honeycomb lattice materials: the 5d iridates A_2IrO_3 (A = Na, Li) and the 4d halide α-$RuCl_3$. These compounds have attracted considerable attention due to predictions of a Kitaev quantum spin liquid with exotic anyonic excitations. However, there has recently been growing interest in the search for Kitaev magnetism in other families of materials with different lattice geometries. In this talk, I will describe several candidates for Kitaev magnetism beyond the honeycomb lattice. This will include (1) potential face-centered-cubic (fcc) Kitaev systems, such as the double perovskite iridates (A_2BIrO_6) and iridium halides (A_2IrX_6), and (2) potential Kitaev chain systems in quasi-1D iridates.

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Keyword-2

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