Evidence for Kitaev quantum spin liquid physics in $\alpha$-RuCl$_3$

The magnetic semiconductor $\alpha$-RuCl$_3$ is composed of very weakly coupled honeycomb layers of edge-sharing RuCl$_6$ octahedra. The Ru$^{3+}$ ion has five $d$ electrons in a low spin state, and the system is expected to have an effective $J = 1/2$ single ion ground state with an interacting spin Hamiltonian containing Kitaev-like terms. Inelastic neutron scattering has revealed the presence of an unusual magnetic excitation exhibiting a continuum in energy. Detailed measurements of the response show evidence for the fractionalized excitations that are characteristic of the Kitaev Quantum Spin-liquid.

See: