Recent advances in the preparation and handling of 2D exfoliated flakes and van der Waals heterostructures has created exciting opportunities to cross-fertilize the fields of nanoscience and bulk quantum materials. Both $\alpha$-RuCl$_3$ and Cr$_{1/3}$NbS$_2$ are excellent examples of the possibilities inherent in this approach. In this talk I will discuss some recent neutron scattering results on single-crystal $\alpha$-RuCl$_3$ that show features consistent with scattering from Majorana excitations of a Kitaev quantum spin liquid. I will also discuss some early results on the nanoscience of atomically thin flakes of alpha-RuCl$_3$. Cr$_{1/3}$NbS$_2$ orders magnetically into a helimagnetic ground state with a period of about 48 nm and with $T_c = 130$ K. The spins are arranged ferromagnetically in the ab-plane and the helix is along the c axis. The effect of an applied magnetic field in the ab-plane has been found to destabilize the helical structure gradually into a soliton lattice, a nonlinear periodic magnetic state, with an eventual incommensurate-to-commensurate transition into a ferromagnetic state at the critical field of 2300 Oe. Manipulation of the spin spiral with magnetic field has generated interest in this material for spintronics applications. In this talk I will discuss recent transport, thermodynamic, and neutron scattering measurements on this material, with particular emphasis on some recent results on nanoflakes.

