Spinon confinement in the one-dimensional f-electron metal Yb_2Pt_2Pb

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The Yb^{3+} magnetic moments in Yb_2Pt_2Pb are seemingly classical, since the large spin-orbit coupling of the 4f-electrons and the crystal electric field dictate a J = +/-7/2 Yb ground state doublet. Surprisingly, the fundamental low energy magnetic excitations in Yb_2Pt_2Pb are spinons on one dimensional chains, shown by inelastic neutron scattering to be in good agreement with the behavior expected with the XXZ Hamiltonian for nearly isotropic, S = +/-1/2 magnetic moments [1]. In fields larger than 0.5 T, the chemical potential closes the gap to the spinon dispersion, modifying the quantum continuum through the formation of a spinon Fermi surface. This leads to the formation of spinon bound states along the chains, coupled to a longitudinally polarized interchain mode at energies below the quantum continuum [2]. I will discuss new measurements of the magnetic field dependence of the confined interchain mode dispersion and spinon continuum in this transition region, showing how the mode is formed as the gap closes. I will also discuss some new research directions in the study of correlated electron materials we are starting in my lab at UK.

[1] L. S. Wu, W. J. Gannon *et al*, *Science* 352, 1206 (2016)

[2] W. J. Gannon *et al*, *Nature Communications* 10, 1123 (2019)