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Quasi-1D heavy fermion magnet Yb_2Pt_2Pb in Magnetic Field[1]

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The Yb^{3+} ions in Yb_2Pt_2Pb form large, seemingly classical Ising magnetic moments, with the large spin-orbit coupling of the 4f-electrons and the crystal electric field forming a $J = \pm 7/2$ Yb ground state doublet [1]. However, from this unlikely host, emerges a continuum of quantum excitations – spinons on one dimensional chains – in good agreement with the behavior expected for nearly isotropic, $S = \pm 1/2$, d-electron magnetic moments [2]. These spinons, in a system with orbitally dominated magnetic constituents, are robust and at low temperatures exist up to 2.3 T, when all Yb magnetic moments become saturated. In magnetic fields larger than 0.5 T, the spinon gap is closed, modifying the quantum continuum through the formation of a fermi surface and spinon bound states between the Yb chains. The ground state doublet nature of the Yb ions ensures that at all fields, transverse excitations are virtually nonexistent, giving unprecedented access to only the longitudinal excitation channel without the presence of spin waves or other transverse damping mechanisms.

[1] M. S. Kim, *et al.*, *Phys. Rev. B.* **77**, 144425 (2008); K. Iwakawa *et al.*, *J. Phys. Soc. Jpn.* **81**, SB058 (2012);Y. Shimura *et al.*, *J. Phys. Soc. Jpn.* **81** 103601 (2012); M. S. Kim and M. C. Aronson, *Phys. Rev. Lett* **110**, 017201 (2013); W. Miiller *et al.*, *Phys. Rev. B* **93**, 104419 (2016). [2] L. S. Wu *et al.*, *Science* **352**, 1206 (2016).

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