Abstract Submitted
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**Excitations of an Ising Ferromagnet in a Transverse Magnetic Field at Quantum Criticality**[1] IVELISSE M. CABRERA, NIST - Natl Inst of Stds Tech, JORDAN D. THOMPSON, RADU COLDEA, DHARMALINGAM PRABHAKARAN, University of Oxford, ROBERT I. BEWLEY, TATIANA GUIDI, ISIS Facility, Rutherford Appleton Laboratory — The Ising chain in a transverse magnetic field is one of the best-known theoretical models for a continuous quantum phase transition. In this model, a magnetic field transverse to the Ising spin axis drives the system from a spontaneously ordered phase to a quantum paramagnetic phase, where very distinct magnetic excitations are expected on each side of the quantum phase transition. The mechanism driving this phase transition has long been predicted to involve the closing of the spin gap, or minimum excitation energy, at the quantum critical point, where a characteristic linear dispersion is expected at low energies. We report single-crystal neutron scattering measurements that unveil how the magnetic order and excitations evolve in the very close proximity of the quantum critical point in the quasi-1D Ising chain ferromagnet $CoNb_2O_6$. Near criticality, we observe an essentially gapless spectrum with an almost perfectly-linear dispersion along the chain direction. To our knowledge, this is the first time that essentially-gapless, linearly dispersive excitations have been observed in the very close proximity of a transverse field-tuned quantum critical point.

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