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Quantum Criticality in YFe_2Al_{10} WILLIAM GANNON, Texas AM University , LIUSUO WU, Oak Ridge National Laboratory, IGOR ZALIZNYAK, Brookhaven National Laboratory, YIMING QIU, JOSE RODRIGUEZ-RIVERA, National Institute of Standards and Technology, MEIGAN ARONSON, Texas AM University — Quantum criticality has been studied in many systems, but there are few systems where observed scaling can be unified with a critical free energy F, or where the critical exponents form the basis for QC universality classes. We have identified a new layered material YFe_2Al_{10} that shows remarkably strong QC behavior, where the scaling properties of the magnetic susceptibility and specific heat are consistent with the same F. Recent neutron scattering results paint a remarkable picture of the QC fluctuations in YFe_2Al_{10}. In contrast to classical transitions, where fluctuations are relatively long ranged and inelastic scattering is observed at a magnetic zone center, in YFe_2Al_{10} the scattering is independent of wave vector in the critical plane, indicating that the fluctuations are spatially localized, while out of plane scattering indicates that the interplaner interactions are restricted to nearest neighbors. The dynamical susceptibility $\chi^{''} \simeq E^{-2}$, and is wholly temperature independent, indicating that E/T scaling is present, the signature of QC fluctuations. These results hint that the the criticality in YFe_2Al_{10} is local, which until now has only been found in a few f-electron based compounds.

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