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Breakdown of the BCS Ground State at a Quantum Phase Transition RAFAEL JARAMILLO, The University of Chicago, YEJUN FENG, Advanced Photon Source, THOMAS ROSENBAUM, The University of Chicago, JONATHAN LANG, ZAHIR ISLAM, GEORGE SRAJER, Advanced Photon Source, PETER LITTLEWOOD, Cambridge University — We use hydrostatic pressure to suppress the magnetism in elemental chromium, a simple cubic metal that demonstrates a subtle form of itinerant antiferromagnetism, formally equivalent to the BCS state in superconductors. By directly measuring the associated charge order with x-ray diffraction in a diamond anvil cell at low temperatures, we reveal a continuous phase transition driven by fluctuations that destroy the BCS-like state while preserving the strong magnetic interaction between itinerant electrons and holes. Cr is unique among stoichiometric magnetic metals studied to date insofar as the quantum phase transition is continuous in nature, allowing experimental access to the naked quantum singularity and a direct probe of the competition between conventional and exotic order in a theoretically tractable material.

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