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High Pressure Study of Magnetic Order in an Itinerant Electron System: Investigating Weak vs. Strong Coupling RAFAEL JARAMILLO, The University of Chicago, Y. FENG, J. C. LANG, Z. ISLAM, APS, Argonne National Laboratory, T. F. ROSENBAUM, The University of Chicago — We measure directly the spin- and charge-density-wave order parameters of the itinerant antiferromagnet Cr via x-ray diffraction as the system is driven towards its quantum critical point with pressure using diamond anvil cell techniques. The exponential decrease of the spin and charge diffraction intensities with pressure confirms the harmonic scaling of spin and charge in this incommensurate system, while the evolution of the incommensurate ordering vector provides important insight into the difference between tuning with pressure and chemical doping. Measurement of the charge density wave over several orders of magnitude of diffraction intensity provides the clearest demonstration to date of a weakly coupled BCS-like ground state. Evidence for coexistence of this weak coupling ground state with incipient magnetic fluctuations at high temperatures in chromium and other more strongly coupled systems raises intriguing questions about the meaning of weak vs. strong coupling and suggests a new category of quantum phase transitions.

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