

Abstract Submitted
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Spin Correlations in the Different Phases of URu₂Si₂ TRAVIS J. WILLIAMS, McMaster University, H. BARATH, Johns Hopkins University, Z. YAMANI, Canadian Neutron Beam Centre, NRC Chalk River, J.A. RODRIGUEZ-RIVERA, J.B. LEO, NIST Center for Neutron Research, J.D. GARRETT, G.M. LUKE, McMaster University, W.J.L. BUYERS, Canadian Neutron Beam Centre, NRC Chalk River, C. BROHOLM, NIST Center for Neutron Research — We report a neutron scattering study of the magnetic excitation spectrum in three temperature and pressure driven phases of URu₂Si₂: the paramagnetic, ‘hidden order’ and antiferromagnetic phases. The experiment was conducted using the novel neutron scattering spectrometer MACS at the NIST Center for Neutron Research[1]. Wide-angle detector coverage offers comprehensive scattering data covering an entire plane in momentum space with excellent energy resolution. The ambient pressure data show a magnetic excitation spectrum characteristic of Fermi surface nesting in the paramagnetic phase and the development of a gap in the excitation spectrum upon cooling through the $T_C = 17.5$ K phase transition. The efficiency of MACS allowed a comprehensive data set in the high-pressure phase. Throughout the (H0L) scattering plane we find qualitatively similar excitations as in the hidden order phase though with a substantial reduction in the overall spectral weight and an upward shift in energy. These data should allow a critical evaluation of recent theoretical work to understand the small and large moment phases of URu₂Si₂. [1] J.A. Rodriguez-Rivera, Meas. Sci. Technol. 19, 034023 (2008).

Travis J. Williams
McMaster University

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