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Spin density in UCoGe JONATHAN TAYLOR, STFC RAL UK, JONATHAN DUFFY, MATTHEW BUTCHERS, Warwick university UK, CHRIS STOCK, NIST, E. BAUER, Los Alamos — Below $T = 0.8\text{K}$, superconductivity and ferromagnetism ($T_C = 3\text{K}$) coexist in UCoGe. The total magnetic moment is $0.03 \mu_B$ at low temperatures. UCoGe is considered to be a weak itinerant ferromagnet. Recent theoretical studies Predict UCoGe indicate that UCoGe is ferromagnetic, but that the small total magnetic moment arises from the near cancellation of large U $5f$ spin and orbital moments. Theory also predicts there to be a Co spin moment. However, the total moment is predicted to be considerably larger than observed experimentally. Using magnetic Compton scattering experiments together with KKR electronic structure calculations we have measured the spin density of the ferromagnetic superconductor UCoGe and determined that at 1.3K the U $5f$ and Co $3d$ spin moments are antiparallel, in agreement with theory, but disagreeing with polarized neutron diffraction results. The measured total spin moment is determined to be $-0.35\mu_B FU^{-1}$, and the orbital moment hence determined to be $0.5\mu_B FU^{-1}$. These moments are reduced with respect to the LDA calculations. The small ratio of U orbital to spin moments indicates that the $5f$ moment is itinerant.

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