

Neutron and Mössbauer studies of FeCr_2Se_4

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(Presented on 1 November 2005; published online 3 May 2006)

FeCr_2Se_4 has been studied with x-ray and neutron diffraction techniques, superconducting quantum interference device magnetometer, and Mössbauer spectroscopy. The crystal structure of FeCr_2Se_4 at 295 K is monoclinic (space group $I2/m$), with the lattice parameters $a=6.267 \text{ \AA}$, $b=3.617 \text{ \AA}$, $c=11.822 \text{ \AA}$, and $\beta=90.69^\circ$, and its magnetic structure is found to be C-type ordering. The Mössbauer spectra were obtained at various temperatures ranging from 4.2 to 295 K. Magnetic hyperfine and electric quadrupole interactions at 4.2 K have been fitted, yielding the following results: $H_{\text{hf}}=108.8 \text{ kOe}$, $\theta=72^\circ$, $\varphi=90^\circ$, $\eta=0$, $\Delta E_Q=(1/2)e^2qQ[1+(1/3)\eta^2]^{1/2}=-1.65 \text{ mm/s}$, and $R=-2.25$. Our study strongly suggests that the quadrupole interaction of FeCr_2Se_4 is larger than the magnetic dipole interaction. © 2006 American Institute of Physics. [DOI: [10.1063/1.2177412](https://doi.org/10.1063/1.2177412)]