

**Neutron Diffraction and  $\mu$ SR Study  
of the  $\text{Eu}_6\text{C}_{60}$  Ferromagnet**

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Exploration of the phase diagram of  $\text{Eu-C}_{60}$  has led to the isolation of the single-phase fullerenes,  $\text{Eu}_3\text{C}_{60}$  and  $\text{Eu}_6\text{C}_{60}$ . Of particular interest is the  $\text{Eu}_6\text{C}_{60}$  sample, which crystallizes in the cubic space group  $Im\bar{3}$  (isostructural with  $\text{Ba}_6\text{C}_{60}$ ) and displays a transition to a ferromagnetic state in the vicinity of 14 K. Magnetic measurements have revealed that all Eu atoms are in the divalent state with a saturation magnetic moment of  $7 \mu_B$  ( $S=7/2$ ). This is consistent with Eu  $L_{III}$ -edge XANES experiments, while there is evidence that the magnetic interactions are not purely of direct exchange nature, but are modulated through the  $\text{C}_{60}$  units.

Here we present a detailed study of its magnetic properties using powder neutron diffraction and zero-field muon spin relaxation measurements.