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Europium $L_{2,3}$ and iron K-edge x-ray magnetic circular dichroism investigation of ferromagnetic ordering in $EuFe_4Sb_{12}$[1] VEMURU KRISHNAMURTHY, Oak Ridge National Laboratory, JONATHAN LANG, DANIEL HASKEL, GEORGE SRAJER, Advanced Photon Source, Argonne National Laboratory, LEE ROBERTSON, BRIAN SALES, DAVID MANDRUS, Oak Ridge National Laboratory — The magnetic behavior of Eu and Fe in the filled skutterudite ferromagnet $EuFe_4Sb_{12}$ has been investigated using Eu $L_{2,3}$ edge and Fe K edge x-ray magnetic circular dichroism (XMCD) spectroscopy. Eu L_3 edge x-ray absorption spectra (XAS) in $EuFe_4Sb_{12}$ clearly show that Eu is in a mixed valence state with about 15% non-magnetic Eu^{3+} states at 5 K. By comparing the XMCD spectra measured at the Eu $L_{2,3}$ edges in the ferromagnetic state at 5 K in $EuFe_4Sb_{12}$ and in the clathrate $Eu_8Ga_{16}Ge_{30}$, in which the *4f* magnetic moment of Eu is known to be 7 μ_B, and by accounting for the mixed valence of Eu in the XAS, we show that Eu^{2+} has the free ion like magnetic moment of $\sim$7 μ_B in $EuFe_4Sb_{12}$. XMCD observed at the Fe K edge in $EuFe_4Sb_{12}$ at 5 K indicates magnetic short range order and a small orbital magnetic moment for the *4p* states of Fe. The relative signs of XMCD at Eu L_3 edge and Fe K edge indicate that the $5d$ spin moment of Eu and the $4p$ spin moment of Fe are ferromagnetically coupled in $EuFe_4Sb_{12}$.

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Vemuru Krishnamurthy
Oak Ridge National Laboratory

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