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Magnetic Polarons in EuB₆ GABRIELLE BEAUDIN, ANDREA BIANCHI, ALEXANDRE DSILETS-BENOIT, Univ of Montreal, MARK LAVER, ROBERT ARNOLD, STEVE SAMOTHRAKITIS, Univ of Birmingham, MICHEL KENZELMANN, JORGE L. GAVILANO, SIMON GERBER, Paul Scherrer Institute, ROBERT CUBITT, CHARLES DEWHURST, Institut Laue Langevin — We present results of small-angle neutron scattering (SANS) experiments on the rare-earth, magnetic semiconductor EuB₆. This compound exhibits two phase transitions: Upon cooling from an insulating state at high temperature, it first becomes metallic with a drop at a T_M of 14.5 K, after which it orders ferromagnetically with a T_C of 11.8 K. We carried out SANS experiments over a large range of scattering wave vectors q from 0.006 to 0.140 Å⁻¹ and temperatures from 2 to 60 K. The experiments show a Lorentzian dependence on the wave vector in the magnetic scattering intensity for temperatures just above T_C , which demonstrates the presence of magnetic polarons. Below T_C , the polarons merge together, and most of the observed intensity is, as indicated by a Lorentzian square dependence, from scattering of wall domains. We calculated a correlation length from this Lorentzian fit and obtained a range of 10² to 10³ Å for the size of the magnetic polarons.

Gabrielle Beaudin
Univ of Montreal

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