Magnetic Polarons in EuB$_6$ 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 EuB$_6$. 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 $10^2$ to $10^3$ Å for the size of the magnetic polarons.