

Under-compensation effect in the Kondo insulator (Yb,Tm)B12

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We present an inelastic neutron scattering study of the influence of isoelectronic Tm substitution on the low-energy structure and temperature dependence of the dynamical magnetic response in (Yb,Tm)B12 solid solutions. Substantial changes have been observed in the spectral structure and temperature evolution of the Yb contribution to the inelastic response for a rather low content of magnetic Tm ions. The spin-exciton-like resonance mode near 15 meV is steeply suppressed at the lowest measured Tm concentration ($x = 0.08$). The spin gap is replaced by a pseudogap at concentrations lower than 0.15. These results point to a specific effect of impurities carrying a magnetic moment (Tm, as compared to Lu or Zr) in a Kondo insulator, which is thought to reflect the “under-compensation” of Yb magnetic moments, originally screened in pure YbB12. A parallel is made with the strong effect of Tm substitution on the temperature dependence of the Seebeck coefficient in (Yb,Tm)B12.

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