Magnetization of $Tm_{1-x}Yb_xB_{12}$ in pulsed and steady magnetic fields

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The magnetization studies of substitutional solid solutions $Tm_{1-x}Yb_xB_{12}$ have been carried out at low temperatures 1.8–40K in steady (SQUID and VSM magnetometry up to 5 T and 11 T, respectively) and pulsed (up to 50 T, KULeuven installation, pulse duration ∼20–100 ms) magnetic fields. The detailed analysis of the magnetization data allows separating two main contributions in the paramagnetic response. The first one is Pauli type component, which is maximal in Tm-rich solid solutions and demonstrates two times decrease in the range $0<x<x_c$ (x_c∼0.3 is the quantum critical point T_N=0).[1] Another contribution should be attributed to localized magnetic moments (∼0.8–3.2 μ_B per unit cell), which are saturated at helium temperatures in the interval of H/T values slightly above ∼3 T/K. Comparison between steady and pulsed field magnetization behavior provides with the arguments in favor of magnetic nanoclusters' formation and short range ordering in $Tm_{1-x}Yb_xB_{12}$ compounds under investigation.

[1]N.E.Sluchanko et al., JETP Lett. **89**, 256 (2009).