

Specific heat of the polydomain Yb_4As_3 system: agreement between spin - 1/2 modelling and experiment

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9.7 cm

New experimental values of specific heat of a polydomain Yb_4As_3 sample in a zero magnetic field are presented. They have been used for estimation of the lattice specific heat and taking into account the Bethe ansatz results, a new value of the exchange integral $J/k_B = -28$ K has been obtained for the Heisenberg model of the antiferromagnetic spin chain $S = 1/2$. A quantitative agreement has been achieved between the experimental specific heat data for a polydomain sample of Yb_4As_3 in magnetic field of different intensities and the numerical results obtained by the transfer-matrix simulation technique. Taking into regard the composition of the sample, 25% of the domains have been assumed to be aligned along the field and 75% perpendicular to it. The perpendicular component generates the staggered magnetic field following from the Dzyaloshinskii-Moriya interactions and the energy gap. The energy gap size has been reanalyzed as a function of the magnetic field, leading to experimental verification of the scaling law following from the sine-Gordon model.

13.4 cm

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