Rotational, Vibrational and Glassy States in Solid Helium with Impurities

N. V. Krainyukova

Institute for Low Temperature Physics and Engineering NASU, Kharkiv, Ukraine

In this work we successfully apply our theory of rotational excitations in solid helium to describe an unusual behaviour of the specific heat of solid helium[1], which increases at temperatures approaching T=0 and for higher impurity (^{3}He) concentrations. We show that three contributions: rotational, vibrational and glassy compete and perfectly describe experimental observations without any additional assumptions. The contribution of glassy states is largest for samples with lowest in energy rotational excitations that supports our idea concerning the reason for stiffening in helium at lowest temperatures when rotational excitations are frozen up.

1. X. Lin, A. C. Clark, Z. G. Cheng, M. H.W. Chan, Phys. Rev. Lett. **102**, 125302 (2009)

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