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The NMR line shape of a system of nuclear spins with equal spin-spin coupling constants

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Abstract

We obtain an expression for the NMR line at low temperatures for a system of nuclear spins described by a Hamiltonian with equal spin-spin coupling constants. We show that in the case of "easy axis" anisotropy, the line has a logarithmic low-frequency singularity and an exponentially decreasing high-frequency asymptotic behavior at the temperature of an anomalous peak of heat capacity. In the case of "easy plane" anisotropy, the line has the traditional Gaussian form. We discuss the possibility of using NMR data to discover specific thermodynamic and magnetic properties of the considered model system. © 2011 MAIK/Nauka.

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Keywords

free induction decay, magnetic ordered structure, NMR line, spin-spin coupling