

Magnetic coupling between rare earth moments in some antiferromagnetic Gd compounds

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Abstract: The rare earth intersublattice exchange coupling has been studied for several Gd-based antiferromagnetic compounds: GdSi, GdGe, GdSi_{1.67}, GdGe_{1.67}, GdAg₂ and GdAu₂ by means of the HFFP (high-field free powder) method. The values of the intersublattice coupling constants obtained by this method were compared with values derived from a mean field analysis of experimental values of the Néel temperature, T_N , and paramagnetic Curie temperature, T_p . For several of the compounds investigated a complete moment reversal from the antiparallel to the parallel configuration could be reached in the high-field regime. The reduced saturation moment of the Gd atoms in the parallel configuration is discussed in terms of a reduced moment contribution of the valence electrons.

Index Keywords: Atoms; Crystal lattices; Electrons; Gadolinium compounds; Magnetic moments; Magnetization; Rare earths; Single crystals; Temperature; High field free powder method; Mean field analysis; Neel temperature; Rare earth intersublattice exchange coupling; Antiferromagnetic materials

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