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Spin Ordering in a Spin-Pair System*

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Abstract

A new type of spin ordering in a spin-pair system is theoretically investigated. In the system, the intra-pair exchange interaction is antiferromagnetic and is much stronger than the inter-pair exchange interaction. In an external magnetic field, the excited triplet of the pair splits, and the lowest component of the triplet crosses the ground singlet at a certain magnitude of the field. In the vicinity of the point of level crossing, even the weak inter-pair exchange interaction causes a considerable amount of mixing between the singlet and the lowest component of the triplet. Due to the mixing, an ordering of the spin component perpendicular to the external field occurs. This ordering explains an anomaly which has been found by Haseda *et al.* in their experiment of cooling by adiabatic magnetization of $\text{Cu}(\text{NO}_3)_2 \cdot 2.5\text{H}_2\text{O}$.

* The 1492nd report of the Research Institute for Iron, Steel and Other Metals. Published in the Journal of the Physical Society of Japan, 28 (1970), 1413.