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Inelastic neutron scattering studies of S=12 and S=4 Mn_6 single molecule magnets BELLA LAKE, OLIVER PIEPER, T. GUIDI, S. CARRETTA, J. VAN SLAGEREN, F. EL HALLAK, P. SANTINI, G. AMORETTI, H. MUTKA, M. KOZA, M. RUSSINA, A. SCHNEGG, C.J. MILIOS, E.K. BRECHIN, A. JULIA, J. TEJADA — The magnetic properties of three Mn_6 molecular magnets have been investigated by means of inelastic neutron scattering. By comparing the obtained data to results from frequency domain magnetic resonance studies it was possible to determine the isotropic exchange and zero-field splitting parameters. The findings enable detailed quantification of the effect of small structural distortions of the molecular geometry on the magnetic properties. We show that the giant spin model completely fails to describe the spin level structure of the ground spin multiplets. A theoretical analysis of the corresponding spin Hamiltonian reveals that the excited S multiplets play a key role in determining the effective energy barrier for magnetization reversal for all three compounds.

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