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Quantifying the size of linear superpositions in molecular nanomagnets FILIPPO TROIANI, CNR-Istituto Nanoscienze, Modena, Italy, PAOLO ZANARDI, University of Southern California, CA 90089-048412345 Los Angeles, USA — Molecular nanomagnets are relatively complex spin systems that exhibit quantum mechanical behavior at low temperatures. Exploiting quantum-information theoretic measures we quantify the size of linear superpositions that can be generated within the ground multiplet of high-spin nanomagnets [1]. In particular, we consider the prototypical single-molecule magnets (namely Mn_{12} and Fe_8), characterized by a ferrimagnetic spin ordering in the ground state. We show that the size of these linear superpositions are comparable to those achievable in mesoscopic systems, and be further enhanced by increasing the asymmetry between the sublattices, and by reducing the competition between exchange interactions within the nanomagnets. The same tools are also applied to the study of low-spin molecules, such as Cr_7Ni and V_{15}, characterized by antiferromagnetic interactions between the constituent spins. The size of the linear superpositions that have been generated within their S=1/2 ground doublets is contrasted with that of single s=1/2 spins.

[1] F. Troiani and P. Zanardi, Phys. Rev. B 88, 094413 (2013);

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