TOROIDAL MAGNETIC STATES IN MOLECULAR WHEELS

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It is shown that non-collinear magnetic quantum states characterised by a spin toroidal magnetic moment of the same order of magnitude as the routinely measured molecular magnetisation can arise in molecular wheels of transition metal ions solely from the interplay between isotropic exchange interactions ($J_{\text{exch}}$) and local zero-field splitting magnetic anisotropy ($D_{\text{ZFS}}$) in the $D_{\text{ZFS}} \gg |J_{\text{exch}}|$ limit. [1] Toroidal spin-states represent the first example of non-collinear Néel states between which tunneling [2] can be strongly quenched as function of the orientation of the local zero-field splitting anisotropy axes. Evidence for the existence of molecular toroidal magnetic moments is provided by means of CASSCF calculations, [3] which lead to a rationalisation of unprecedented experimental results [4, 5, 6] regarding the (lack of) low-field dipolar magnetic response displayed by Dysprosium triangular wheels with an odd number of unpaired electrons.