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# Measurement of Magnetic Exchange in Asymmetric Lanthanide Dimetallics

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We have been investigating the magnetic interactions between lanthanide ions in a series of isostructural asymmetric dimetallic complexes of dysprosium(III), erbium(III) and ytterbium(III). Using a barrage of techniques including electron paramagnetic resonance spectroscopy, inelastic neutron scattering, and complete active space self-consistent field calculations, we have determined the highly anisotropic magnetic coupling matrix within the low-lying manifold spanned by the ground Kramers doublets of each ion.

In all cases the magnetic interaction is not solely dipolar in origin, indicating a measurable superexchange component. We find a unique orientation for the magnetic interaction matrix, corresponding to a common elongated oxygen bridge for the erbium(III) and ytterbium(III) analogues, suggesting a microscopic physical connection to the magnetic superexchange. These results are vital for building and validating model microscopic Hamiltonians to understand the origins of magnetic interactions between lanthanides and how they may be controlled with chemistry.

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## Topic

Chemistry

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