

SPIN DYNAMICS OF A MOLECULAR CERIUM QUBIT

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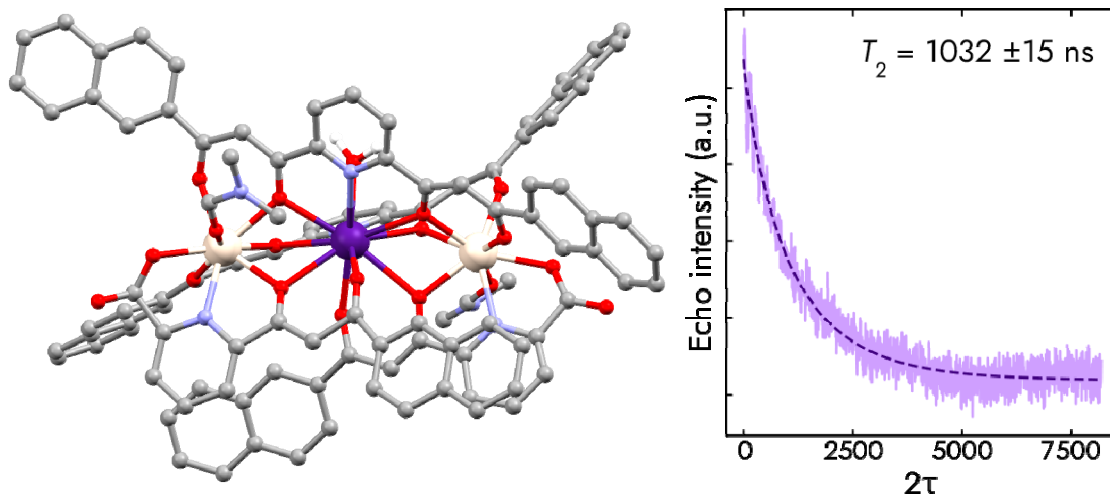
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Spin states in molecular systems constitute a promising platform for the physical implementation of qubits and quantum logic gates within emerging quantum technologies. This approach benefits from the versatility of chemical design, which enables atomistic control over key magnetic and electronic properties while ensuring high structural reproducibility across identical molecular units. Such tunability allows precise engineering of coherence, coupling interactions, and environmental effects that are critical for quantum information processing. [1] Previous work from our research group claimed that a trinuclear molecular complex of composition [ErCeEr] can operate as a platform for implementing a quantum error-correction circuit, highlighting the potential of heterometallic molecular architectures for scalable quantum operations. [2]

In this work, we introduce a new synthetic methodology to the [LnLn'Ln] assemblies together with a detailed investigation of the spin dynamics of a cerium(III)-based qubit embedded in a heterometallic molecular assembly of composition [LuCeLu] in solid polycrystalline state through magnetic measurements, NMR, and pulsed EPR.



[1] Aromí, G., Aguilà, D., Gamez, P., Luis, F. Roubeau, O. Chem. Soc. Rev. 41, 537–546 (2012).

[2] Macaluso, E. et al. Chem. Sci. 11, 10337–10343 (2020).