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ELECTRO-NUCLEAR CLOCK TRANSITIONS IN A Ho(III) MOLEULAR NANOMAGNET[1] DORSA KOMIJANI, M. SHIDDIQ, Department of Physics, Florida State University (NHMFL), FL, Y. DUAN, A. GAITA-ARINO, E. CORONADO, Instituto de Ciencia Molecular (ICMol), Universidad de Valencia, Spain, S. HILL, Department of Physics, Florida State University (NHMFL), FL — One of the challenges in the field of quantum information processing involves protecting qubits against decoherence. The primary source of decoherence in spin qubits at low temperatures is the dipolar interaction, which can be minimized using so-called clock transitions [1]. Here, we report pulsed EPR studies of the Holmium Polyoxometalate, $[Na]_9[Ho_xY_{1-x}(W_5O_{18})_2]$, where we observe electro-nuclear clock transitions that involve coupled dynamics of the electron and nuclear spins ($\Delta m_J = \pm 8$ and $\Delta m_I = \pm 1$). These transitions are formally forbidden in EPR. However, the symmetry of this molecule generates admixtures of the ground doublet ($m_J = \pm 4$) through second order perturbation, and application of a transverse magnetic field mixes m_I and $m_I \pm 1$ states, allowing such transitions to occur in the vicinity of avoided level crossings. Pulsed EPR measurements on an x = 0.1 sample, were carried out at a temperature of 5 K at X-band. These experiments suggest an enhancement in the coherence time at these electro-nuclear clock transitions which is significant for applications in hybrid magnetic qubits, where manipulation of the nuclear spin is controlled by EPR pulses. [1] G. Wolfowicz, et al., Nature Nanotechnology 8, 561 (2013).

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Dorsa Komijani
Department of Physics, Florida State University (NHMFL), FL

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