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A wolf in sheep's clothing? Muon-induced magnetism in quantum spin ice

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Compounds of the form $A_2X_2O_7$ with the pyrochlore structures can exhibit classical or quantum spin ice behaviour if the crystal field environment of the AO_8 arrangement leads to the [111] easy-axis anisotropy. When Pr occupies the A-site, there is a low-lying electronic doublet and $Pr_2X_2O_7$ compounds are found to be quantum spin ices[1]. Pr^{3+} is a non-Kramers ion and the presence of the muon can distort nearby PrO_8 units and split the doublet ground states[2], resulting in an enhancement of the Pr nuclear moment due to hyperfine coupling with the electronic moments[3]. We explore this effect using a theoretical model that takes account of the important interactions and compare our simulations with μSR data on samples of $Pr_2X_2O_7$ (X = Sn, Hf, Zr) and new experimental data on Pr_2ScTaO_7, a candidate system that simultaneously realises spin ice and charge ice structures.

References:
1. A. Princep, *Phys. Rev. B* **88**, 104421 (2013)
2. F. Foronda et al., *Phys. Rev. Lett.* **114**, 017602 (2015)
3. B. Bleaney, *Physica* **69**, 317 (1973)

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