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How muons alter spin ice and what they probe STEPHEN BLUNDELL, FRANZISKA KIRSCHNER, FRANZ LANG, FRANCESCA FORONDA, ANDREW BOOTHROYD, University of Oxford, TOM LANCASTER, University of Durham, FRANCIS PRATT, STFC, Rutherford Appleton Laboratory, DHARMALINGAM PRABHAKARAN, University of Oxford — Muons implanted into spin ice sit at a well-defined site that is now determined using DFT+ μ calculations. It is also known [Foronda et al., PRL **114**, 017602 (2015)] that the muon-induced distortion in Pr-containing pyrochlores leads to a dominating effect on the muon-induced response. We show that the effect in Dy- and Ho-containing systems is quite different, even though the muon site and muon-induced distortions are similar. By using further DFT+ μ calculations and in experiments on Dy₂Ti₂O₇, Ho₂Ti₂O₇, as well as Sc-doped samples, we show that this picture can be understood quantitatively and allows us to understand the relationship between the muon-induced response and the magnetic properties. We assess the extent to which muon measurements in these systems can be sensitive to monopole behaviour.

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