Spin transfer in Prussian blue, measured using polarised neutron diffraction

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Prussian Blue, $Fe^{III}_4[Fe^{II}(CN)_6]_3 \cdot xH_2O$, is the archetypal mixed-valent molecular ferromagnet. It displays ferromagnetic ordering of the high spin Fe(III) spins below T_c=5.5 K. Arguments based on the charge transfer transition in the optical absorption spectrum at 14100 cm^{-1} that gives rise to its well known intense blue colour, led Day and coworkers to search for spin transfer from the high-spin Fe(III) to the nominally diamagnetic Fe(II) using polarised neutron diffraction.[1] Technical limitations at the time restricted their measurements to only 3 reflections. 30 years on, using state-of-the-art nuclear polarised ^{3}He technology, we re-examined the same sample of deuterated Prussian blue and demonstrate conclusively the existence and sign of spin transfer from Fe^{3+} to the Fe^{2+}.[2]

References

[1] - P. Day, F. Herren, A. Ludi *et al.*, Helvetica Chimica Acta **63,** 148 (1980).
[2] A.S. Wills, E. Lelièvre-Berna, F. Tasset, J. Schweizer, R. Ballou, *Physica* B **356**, 254 (2004).