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Theory of the NMR $1/T_1$ relaxation rate in a quantum spin nematic ANDREW SMERALD, NIC SHANNON, Okinawa Institute of Science and Technology — Recently, it has been proposed that the material $LiCuVO_4$ may realise quantum spin-nematic order when a magnetic field close to saturation is applied [1,2]. Potentially, a bond-centred, 2-sublattice antiferroquadrupole spin-nematic state is stable at low temperature. However, the experimental evidence for this state remains inconclusive. Building on previous work [3], we develop a detailed theory of the NMR $1/T_1$ relaxation rate in spin-nematic states, and apply this to the specific case of $LiCuVO_4$. We show that $1/T_1$ in the proposed spin-nematic state has qualitatively different features to conventionally ordered magnets, and propose this as an unambiguous test of spin-nematic order.

[1] L.E. Svistov et al., JETP Letters **93**, 21 (2010).
[2] M.E. Zhitomirsky and H. Tsunetsugu, EPL **92**, 37001 (2010).
[3] A. Smerald and N. Shannon, Phys. Rev. B **84**, 184437 (2011).

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