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(G*) Dynamic and frozen quantum magnetism in the ground states of triangular lattice magnets YbMgGaO4, ErMgGaO4 and YbCoGaO4 from inelastic neutron scattering

Wednesday 8 June 2022 11:00 (15 minutes)

The putative quantum spin liquid (QSL) state exhibited by $YbMgGaO_4$ is largely ascribed to the quasi-2D triangular lattice which the magnetic Yb^{3+} moments decorate in concert with anisotropic exchange and disorder in neighbouring disordered Mg^{2+}/Ga^{3+} bilayers [1,2,3]. We present new inelastic neutron scattering (INS) measurements on $YbMgGaO_4$ as well as its isostructural sister compounds: $ErMgGaO_4$ and $YbCoGaO_4$. Each material was synthesized as a phase-pure powder and INS measurements were performed on IN6-Sharp with E_i = 3.1 meV at the Institut Laue-Langevin. We discuss the observed hallmarks of a QSL in $YbMgGaO_4$ and contrast these with signatures of frozen spin correlations in each of $ErMgGaO_4$ and $YbCoGaO_4$ in the INS measurements. The case of $YbCoGaO_4$ is an interesting one as it displays the interplay between a QSL-like state associated with the Yb^{3+} magnetism, interleaved with a two-dimensional spin glass state originating from the disordered Co^{2+} magnetism.

[1] Paddison, J., Daum, M., Mourigal, M. et al. Nature Phys 13, 117–122 (2017)
[2] Li, Y., Adroja, D., Zhang, Q. et al. Phys. Rev. Lett. 118, 107202 (2017)
[3] Zhu, Z., Maksimov, P. A., Chernyshev, A. L. et al. Phys. Rev. Lett. 119, 157201 (2017)

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