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(G*) POS-G60 – Large Magnetic Anisotropy in Spinel Vanadate Thin Films

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Bulk spinel vanadate crystals are structurally cubic and ferrimagnetic, with biaxial anisotropy along the cubic axes. However, for thin film Cobalt Vanadate, an orthorhombic crystal structure leads to very different and stronger magnetic anisotropies. Data from torque magnetometry shows a uniaxial anisotropy with the magnetic easy axis shifting from out-of-plane at high temperatures, to in-plane upon cooling. At low temperature, the out-of-plane magnetic hard axis is shown to not saturate until ˜20T, whereas the in plane magnetic hard axis does not saturate even at 30T. Comparing the torque data to previous zero field neutron diffraction measurements [1] suggest that a field dependent structural distortion may be responsible for the large anisotropies.

[1] Thompson, C. J., Reig-I-Plessis, D., Kish, L., Aczel, A. A., Zhang, B., Karapetrova, E., Macdougall, G. J., & Beekman, C. (2018). Spin canting and orbital order in spinel vanadate thin films. Physical Review Materials, 2(10). https://doi.org/10.1103/PhysRevMaterials.2.104411

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