



## Long-range order, re-entrant spin glass and spin liquid correlations in Anion disordered Gd<sub>2</sub>Hf<sub>2</sub>O<sub>7</sub>

*Tuesday, 21 March 2023 16:00 (2 hours)*

Pyrochlore antiferromagnets (AFM) Gd<sub>2</sub>T<sub>2</sub>O<sub>7</sub> (T: tetravalent metal elements) are prototypical materials for realizing classical spin liquid states. However, all of them have been observed to show long-range magnetic order [1-3]. Previous specific heat data of Gd<sub>2</sub>Hf<sub>2</sub>O<sub>7</sub> show a tiny sharp peak on the top of a large broad maximum indicating a long-range AFM order [4]. However, our sample does not show that sharp peak in specific heat, but the ac susceptibility evidences an ordering transition followed by a spin-glass transition. Using neutron diffraction, we found that the sample has oxygen Frankel defects. The polarized neutron diffuse scattering pattern shows liquid-like scattering without any magnetic Bragg peaks. The subtle long-range order and re-entrant spin glass are attributed to bond disorder due to oxygen anion disorder.

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- [2] X. Li et al., *Phys. Rev. B* 94, 214429 (2016).
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- [4] M. D. Alice et al., *J. Phys: Conden Matter* 20, 235208 (2008).

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