



Contribution ID: 145

Type: **Talk**

## Spin-liquid-like state in anion-disordered $\text{Gd}_2\text{Hf}_2\text{O}_7$

*Tuesday, December 8, 2020 2:05 PM (25 minutes)*

Pyrochlore antiferromagnets (AFM)  $\text{Gd}_2T_2\text{O}_7$  ( $T$ : tetravalent metal elements) are prototypical materials for realizing classical spin liquid states. However, most of them have been observed to show long-range magnetic order. Previous studies show that  $\text{Gd}_2\text{Hf}_2\text{O}_7$  has Curie-Weiss temperature  $\approx -7.3$  K and a tiny sharp peak on the top of a large broad maximum in the specific heat data indicating a long-range AFM order. Here we present our investigation on the nuclear and magnetic structures of  $\text{Gd}_2\text{Hf}_2\text{O}_7$ . Using neutron diffraction, we found that the sample has  $\sim 8\%$  oxygen Frankel defects with undetectable Gd/Hf antisite defects. The polarized neutron diffuse scattering pattern shows liquid-like scattering at 30 mK without any magnetic Bragg peaks, evidencing a spin-liquid-like ground state. The pattern was further analyzed using reverse Monte Carlo method together with unsupervised machine learning techniques, which reveals a Palmer-Chalker order over the range of a single unit cell. Bond disorder due to oxygen anion disorder may be responsible for the absence of long-range order.

**Primary authors:** XU, Jianhui (MLZ, TUM); Dr ANAND, Vivek (SRM University); Dr RITTER, Clemens (Institut Laue-Langevin); Dr ANDREW, Wildes (Institut Laue-Langevin); Prof. LAKE, Bella (Helmholtz Zentrum Berlin)

**Presenter:** XU, Jianhui (MLZ, TUM)

**Session Classification:** MLZ Users 2020 - Quantum Phenomena

**Track Classification:** UM: Quantum Phenomena