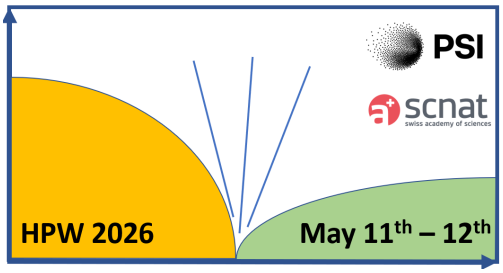

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Pressure induced spin liquid state in the anisotropic kagome Y-kapellasite Y3Cu9(OH)19Cl8

Tuesday, 12 May 2026 10:00 (20 minutes)

Y-kapellasite (Y3Cu9(OH)19Cl8) materializes an anisotropic kagome model with 3 different nearest neighbor interactions, yielding a rich phase diagram [1]. Besides two long range ordered phases, this phase diagram features a large spin liquid area, which encompasses the isotropic kagome model. Noticeably the large difference in the Y and Cu radii prevents inter-site mixing and the anisotropic kagome planes are free from magnetic defects. We present a detailed investigation of large, phase pure, single crystals of this compound by neutron scattering, and local μSR and NMR techniques [2]. At variance with polycrystalline samples, the study of single crystals gives evidence for subtle structural instabilities at 33 and 13 K and a bulk magnetic transition at 2.1 K, well below the antiferromagnetic 100 K Weiss temperature. The structural instabilities involve the localization of one interlayer proton and, importantly, preserve the kagome planes. At 2.1 K the compound shows a magnetic transition to the coplanar (1/3,1/3) long-range order as predicted theoretically. However, our analysis of the spin-wave excitations yields an estimate of magnetic interactions, which locate the compound closer to the phase boundary to the spin-liquid phase than expected from ab initio calculations. Enhanced quantum fluctuations at this boundary may be responsible for the reduced ordered moment of the Cu2+ and hint at a strong effect of external perturbations. **Indeed, in recent μSR experiment under pressure, we could establish that the fragile long range order is suppressed in favor of a fluctuating ground state with a moderate 23 kbar applied pressure [3]. This finding is rationalized by new high pressure diffraction results showing a tendency towards a more isotropic lattice in the same range of applied pressures [3].**

[1] M.Hering et al , npj Comput Mater 8, 10 (2022)
[2] D.Chatterjee et al , Phys. Rev. B 107, 125156 (2023)
[3] D.Chatterjee et al , arXiv:2502.09733 (2025)

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