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Kagome spin ice and strange metal phases

Monday 5 January 2026 08:45 (35 minutes)

In the talk, I will focus on two members of the ZrNiAl structure type with twisted magnetic kagome layers. HoAgGe represents the first crystalline realization of kagome spin ice, evidenced by neutron scattering, and displays striking fractionalized plateau states in magnetic and transport experiments [1-3].
CrNiAs is a kagome metal in which the ferromagnetic order of Cr moments can be continuously suppressed under hydrostatic pressure. Remarkably a broad pressure range over which strange-metal behavior persists beyond the critical pressure is found contrasting sharply with conventional quantum criticality [4].

[1] K. Zhao, H. Deng, H. Chen, K.A. Ross, V. Petricek, G. Günther, M. Russina, V. Hutanu, P. Gegenwart: Realization of the kagome spin ice state in a frustrated intermetallic compound, Science 367, 1218 (2020).
[2] K. Zhao, Y. Tokiwa, H. Chen, P. Gegenwart: Time-reversal-like degeneracies distinguished by the anomalous Hall effect in a metallic kagome ice compound, Nat. Phys. 20, 442 (2024).
[3] Kan Zhao, Hao Deng, Hua Chen, Nvsen Ma, Noah Oefele, Jiesen Guo, Xueling Cui, Chen Tang, Matthias J. Gutmann, Thomas Mueller, Yixi Su, Vladimir Hutanu, Changqing Jin, Philipp Gegenwart, Nonlinear time-reversal symmetry breaking in kagome spin ice HoAgGe, arXiv:2505.22544.
[4] Bin Shen, Feng Du, Franziska Breitner, Victoria A. Ginga, Ece Uykur, Alexander A. Tsirlin, Philipp Gegenwart, Pressure-induced strange metal phase in a metallic kagome ferromagnet, arXiv:2503.09524.

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