第 557 回物性セミナー

Frustrated rare-earth Kagome metals

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Frustrated magnetism arises when it is impossible to fully satisfy all of pairwise interactions. It can lead to interesting novel phases such as quantum spin liquids and emergent fractionalized excitations. While frustrated magnetism is exciting already in the absence of charge carriers, additional complexity can arise in magnetically frustrated metals. This can be studied in rare-earth intermetallics crystallizing in the ZrNiAl structure. Therein, 4f moments on the Zr site form a distorted kagome lattice. Different examples with Kondo interactions, ranging from extremely small up to the intermediate valence regime, will be discussed: Kagome spin-ice in HoAgGe with huge anomalous Hall effect, signaling a hidden time-reversal-like degeneracy [1,2], partial magnetic frustration and a spin-liquid phase [3], as well as magnetic correlations deep in the intermediate valence regime [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, submitted.

[3] M. Majumder, R. Gupta, H. Luetkens, R. Khasanov, O. Stockert, P. Gegenwart, V. Fritsch: Spin-liquid signatures in the quantum critical regime of pressurized CePdAl, Phys. Rev. B 105, L180402 (2022).

[4] Y. Shimura, A. Wörl , M. Sundermann, S. Tsuda, D.T. Adroja, A. Bhattacharyya, A.M. Strydom, A.D. Hillier, F.L. Pratt, A. Gloskovskii, A. Severing, T. Onimaru, P. Gegenwart, T. Takabatake: Antiferromagnetic Correlations in Strongly Valence Fluctuating CeIrSn, Phys. Rev. Lett. 126, 217202 (2021).

共同セミナー「理工学融合共同演習」（博士課程前期）の認定科目です。

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