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From pyrochlore to the tripod kagome lattice[1]

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Finding new kagome lattice-containing compounds with spin-type variability has been an experimental challenge for realizing the exotic states predicted theoretically. Recently, we discovered such a new kagome compound family, $A_2RE_3Sb_3O_{14}$ (A = Mg, Zn; RE = rare earth element), by partial ion substitution in the pyrochlore lattice. These compounds feature a hitherto unstudied structure, namely the "tripod kagome lattice". In this talk, I shall demonstrate that due to the unique tripod-like spin anisotropies and a large variability of the rare earth spin sets, the complex interplay between crystal field splitting and spin-spin interactions in the tripod kagome lattice leads to various exotic states. These include a dipolar spin order, a magnetic charge order, a quantum kagome ice, a quantum spin liquid, and a possible Kosterlitz-Thouless transition, as evidenced by our susceptibility, specific heat, and neutron scattering measurements. We hope our works will stimulate both experimental and theoretical studies on these exciting compounds.

References: [1] Z. L. Dun, J. Trinh, K. Li, M. Lee, K. W. Chen, R. Baumbach, Y. F. Hu, Y. X. Wang, E. S. Choi, B. S. Shastry, A. P. Ramirez, and H. D. Zhou, Phys. Rev. Lett. 116, 157201 (2016). [2] Z. L. Dun, J. Trinh, M. Lee, E. S. Choi, K. Li, Y. F. Hu, Y. X. Wang, N. Blanc, A. P. Ramirez, H. D. Zhou, arXiv:1610.08396.

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