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Finite-temperature twisted-untwisted transition of the kagome lattice DESHPREET BEDI, D. ZEB ROCKLIN, XIAOMING MAO, University of Michigan — Mechanical instability governs many fascinating phenomena in nature, including jamming, glass transitions, and structural phase transitions. Although mechanical instability in athermal systems is well understood, how thermal fluctuations modify such transitions remains largely unexplored. Recent studies reveal that, due to the large number of floppy modes that emerge at mechanical instability, intriguing new phenomena occur, such as fluctuation-driven first-order transitions and order-by-disorder. In this talk, we present an analytic study of the finite-temperature rigidity transition for the kagome lattice. Our model exhibits a zero-temperature continuous twisted-untwisted transition as the sign of the next-nearest-neighbor spring constant changes. At finite temperature, we show that the divergent contribution of floppy modes to the vibrational entropy renormalizes this spring constant, resulting in a first-order transition. We also propose an experimental manifestation of this transition in the system of self-assembling triblock Janus particles.

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