

Quantum many-body topology of quasicrystals

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In this talk, I will discuss the characterization of quasicrystalline interacting topological phases of matter i.e., phases protected by some quasicrystalline structure. The elasticity theory of quasicrystals, which accounts for both "phonon" and "phason" modes, admits non-trivial quantized topological terms with far richer structure than their crystalline counterparts. I will show that these terms correspond to distinct phases of matter and also uncover intrinsically quasicrystalline phases, which have no crystalline analogues. For quasicrystals with internal $U(1)$ symmetry, I will then discuss a number of interpretations and physical implications of the topological terms, including constraints on the mobility of dislocations in two-dimensional quasicrystals and a quasicrystalline generalization of the Lieb-Schultz-Mattis-Oshikawa-Hastings theorem.