Protected Zero Energy States in Quasicrystals EZRA DAY-ROBERTS, RAFAEL FERNANDES, ALEX KAMENEV, University of Minnesota — Several two-dimensional bipartite quasicrystals display a macroscopically large number of zero-energy states (ZES) in their density of states. Although the existence and even the precise number of ZES are known, their origin remains debated. Here we argue that these ZES arise from the topology of the lattice – in particular, from the intrinsic local mismatch between the two sublattices that form the bipartite quasicrystal. While in the kite-and-dart lattice there is no difference between local and global mismatch, the rhombus Penrose lattice self-organizes in local domains with different signs of the sublattice mismatch. We construct a theoretical framework that demonstrate the equivalence between the total local mismatch and the ZES, and discuss the robustness of ZES and their possible experimental manifestations.

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