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**Quantum Fluctuations and Excitations in Magnetic Quasicrystals** STEFAN WESSEL, University of Stuttgart, IGOR MILAT, ETH Zurich — We study the effects of quantum fluctuations and the excitation spectrum for the antiferromagnetic Heisenberg model on the octagonal tiling, a two-dimensional quasicrystal structure. Using a combination of quantum Monte Carlo and numerically solved spin-wave theory, a non-trivial inhomogeneous magnetic ground state is found. A hierarchical structure in the values of the staggered moments is observed which arises from the self- similarity of the quasiperiodic lattice. The magnetic excitation spectrum consists of magnon-like low-energy modes, as well as dispersionless high-energy states of multifractal nature. The dynamical spin structure factor exhibits linear soft- modes at low energies, self-similar structures with bifurcations emerging at intermediate energies, and flat bands in high-energy regions. This generic model is a first step towards understanding magnetic quasicrystals such as the recently discovered Zn-Mg-Ho icosahedral structure.

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