Pure Point Diffraction in Aperiodic Structures

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One of the extraordinary features of both real physical quasicrystals and some of the famous aperiodic tilings, like the Penrose tilings, is that they are essentially pure point diffractive. Two problems arise from this. First, what kind of discrete structures can we construct for which we can prove pure point diffractivity, and second, the ages old problem, what can we determine about a discrete structure by looking only at its diffraction image?

In this talk we will discuss diffraction and the mathematics that has been generated over the past few years to discuss it. We give a number of nice examples of structures for which it arises, and finally show how an ansatz called the cut and project formalism seems to unify the picture.

The talk will be suitable for a general mathematical audience.