

Title: Wang tiles, the Kari tileset, and computation in tilings

Abstract: A *Wang tile* is a unit square where each edge is marked with an arbitrary symbol. Given a finite set of Wang tiles (a *tileset*), a *tiling* is an infinite grid where each cell contains a copy of a tile, such that two adjoining edges always bear the same symbol. Some tilesets admit tilings of the plane while others don't, and the problem of finding whether a tileset admits a tiling is algorithmically undecidable.

The study of Wang tiles has a rich history and gave a wealth of results. Perhaps the most striking one is that it is possible to construct a tileset that forces all its tilings to be aperiodic. Many such constructions have been found between the 1960s and the present day. In this talk we'll focus on the one published by Jarkko Kari in 1996, which radically differs from all previous attempts.

We'll see how the construction works and how it can be extended to show more than just aperiodicity, up to arbitrary (algorithmic) computations. We'll also see a heuristic argument which suggests that Kari's construction is radically different from all previous aperiodic tilesets. That argument involves the concept of topological entropy for tiles, so we'll briefly discuss it as well.