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Aperiodic Tilings and Ordered Cohomology

Abstract

Given an aperiodic tiling of the plane, we can assign to it the space of all tilings which are 'locally isomorphic' to the original. This tiling space has a natural translation action. The topology and dynamics of these tiling spaces then reveal properties of the original tiling and vice versa. In general, these spaces are almost never the 'nice' spaces we expect to see in algebraic topology or geometry (they are rarely CW complexes). I will speak about how one particular invariant of these spaces, the Cech cohomology, can fully classify large classes of these tilings. To do this, we need to prescribe a natural ordering on the cohomology groups which is in some way related to the densities of patches in the original tiling.