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Tilings, continued fractions, and C^*-algebras

Ten years ago, J. Mingo classified, up to translation, all one-dimensional tilings arising from the projection method applied to a line in two-dimensional space. The invariant, which is closely related to the continued fraction expansion of the slope of the line, is a sequence space with an equivalence relation. The associated quotient topological space is difficult to study because it is not Hausdorff (in fact, every equivalence class is dense), but there is an associated AF C^*-algebra that has an easily computable Bratteli diagram.

In this talk I will describe how this sequence space and its associated C^*-algebra can be constructed for projection tilings of a line in higher-dimensional space. A generalization of the usual continued fraction expansion is central to this construction; however, whereas in two dimensions the continued fraction expansion of the slope of a line is essentially unique, in higher dimensions there are many different continued fraction expansions with different convergence properties. Hence it is the continued fraction, not the line, that determines the sequence space and C^*-algebra. I will describe some properties of the continued fraction that can be formulated in terms of K-theory.