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Title: Tiling Problems and Spectral Sets

Abstract: A set E in R^n is called spectral if $L^2(E)$ has an orthogonal basis consisting of exponential functions. The simplest example is a rectangular box; however, spectral sets can be much more complicated. A conjecture due to B. Fuglede asserts that a set is spectral if and only if it tiles R^n by translations. The purpose of this talk is to discuss the recent work on the problem, with emphasis on the connections to other fields of mathematics such as combinatorics, algebra, and number theory.