Connected examples for tiling and spectral problems

MIHALIS KOLOUNTZAKIS
University of Crete

Recently Greenfeld and Tao found an example of a finite subset in $\mathbb{Z}^d$ (for some large d) which tiles $\mathbb{Z}^d$ by translations but only aperiodically, thus disproving the so-called *Periodic Tiling Conjecture* in high enough dimension.

Roughly 20 years ago the Fuglede (or Spectral set) conjecture was disproved by Tao (in the spectral implies tiling direction) and by Kolountzakis and Matolcsi (in the tiling implies spectral direction). In this problem the dimension d eventually got down to 3 for both directions.

In both these problems (aperiodicity and Fuglede conjecture) the examples found are highly dispersed subsets of $\mathbb{Z}^d$. In this work we show how to modify these examples to obtain (pathwise) *connected* subsets of $\mathbb{Z}^d$ as examples by increasing the dimension d.

This is joint work with Rachel Greenfeld.