Bounded degree high dimensional expanders

Abstract:

Expander graphs are widely studied, and various methods are known to obtain bounded degree expander graphs. Recently, there is a growing interest in understanding combinational expansion in higher dimensions (higher dimensional simplicial complexes). However, bounded degree combinatorial expanders (random or explicit) were not known till our work.

We present a local to global criterion on a complex that implies combinatorial expansion. We use our criterion to present explicit bounded degree high dimensional expanders. This solves in the affirmative an open question raised by Gromov, who asked whether bounded degree high dimensional expanders could at all exist.

We expect that the emerging theory of high dimensional expansion is likely to have various application in the theory of computation. Thus, one of the goals of this talk is to introduce this concept to the theory community.

Based on joint works with David Kazhdan and Alex Lubotzky, and with Shai Evra.