The diameter of uniform spanning trees

Peleg Michaeli, Tel Aviv University

The **uniform spanning tree** (UST) of a finite connected graph G is the uniform measure over all spanning trees of G. In the last few decades, structural properties of the UST of the complete graph on n vertices, which is simply a uniformly chosen random labelled tree, have been studied. Today both local and global aspects of the asymptotic structure of these trees are well understood, and suitable and fairly simple limiting objects exist. In particular, the exact asymptotic distribution of the **diameter** of the UST, arguably its most significant global aspect, is known, and is of order $\sqrt{n}$.

Since the early 90's, focus has shifted towards the more complicated problem of general (large) base graphs. In this work we show that under very mild expansion assumptions on the base graph (on n vertices), the diameter of the UST is of order $\sqrt{n}$, as in the complete graph. In particular, our result holds for balanced expanders, tori of dimension at least 5, and the hypercube. In our work we analyse the two famous algorithms for generating the UST, and introduce a variation of **random interlacements** which is suitable for finite graphs.

Based on joint work with Asaf Nachmias and Matan Shalev.