THE ZERO SET OF THE INDEPENDENCE POLYNOMIAL OF A GRAPH

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ABSTRACT: In statistical mechanics, the independence polynomial of a graph $G$ arises as the partition function of the hard-core lattice gas model on $G$. The distribution of the zeros of these polynomials when $G \to \infty$ is relevant for the study of this model and, in particular, for the determination of its phase transitions.

In this talk, I will review the known results on the location of these zeros, with emphasis on the case of rooted regular trees of fixed degree and varying depth $k \geq 0$. Our main result states that for these graphs, the zero sets of their independence polynomials converge as $k \to \infty$ to the bifurcation measure of a certain family of dynamical systems on the Riemann sphere.

This is ongoing work with Juan Rivera-Letelier (Rochester).