RANDOM WALKS ON PLANAR GRAPHS VIA CIRCLE PACKINGS

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I will describe two results concerning random walks on planar graphs and the connections with Koebe's circle packing theorem (which I will not assume any knowledge of):

1. A bounded degree planar triangulation is recurrent if and only if the set of accumulation points of its circle packing is a polar set (that is, has zero logarithmic capacity). This extends a result of He and Schramm who proved recurrence (transience) when the set of accumulation points is empty (a closed Jordan curve). Joint work with Ori Gurel-Gurevich and Juan Souto.

2. The Poisson boundary (the space of bounded harmonic functions) of a transient bounded degree triangulation of the plane is characterized by the topological boundary obtained by circle packing the graph in the unit disk. In other words, any bounded harmonic function on the graph is the harmonic extension of some measurable function on the boundary of the unit disc. Joint work with Omer Angel, Martin Barlow and Ori Gurel-Gurevich.