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Title: “Studying universality classes of triangulations in dimensions greater than 2”

It is well known that families of planar maps, e.g. triangulations, quadrangulations and generic maps, share universal properties in the large scale limit, such as the entropy exponent from their asymptotic enumeration, or their continuum limit known as the Brownian sphere. Few theorems exist in higher dimensions, due to the intricate nature of higher-dimensional combinatorics and topology. In this introductory talk, we will show that colored triangulations provide a good arena because they are amenable to precise combinatorial analysis and theorems can be proven. I will focus on a combinatorial generalization of Euler's relation for planar triangulations, which is to bound the number of (d-2)-simplices linearly in the number of d-simplices, and identifying the triangulations which maximize the bound for different colored building blocks. In 3d, I prove that those triangulations, built from any set of colored building blocks homeomorphic to the 3-ball, are in bijection with trees (or branched polymers). In even dimensions, we have proved that other universality classes can be recovered. Other interesting approaches are in preparation and would be interesting to mention if time permits.