What is the γ-vector? (And what does it count?)

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008 Kemeny Hall, 4:00 pm
(Tea 3:30 pm 300 Kemeny Hall)

Abstract

The *Charney-Davis conjecture* is a reformulation of a conjecture of Hopf about the Euler characteristic of a nonpositively curved Riemannian manifold. Incredibly, Charney and Davis showed that their conjecture boils down to a conjecture about the combinatorics of certain simplicial complexes with the homology of sphere. The "f-vector" of a simplicial complex counts the number of simplices in the complex according to dimension (number of vertices, edges, triangles, etc.). Loosely speaking, the conjecture follows if one can come up with an adequate characterization of the f-vectors of these sorts of simplicial spheres.

I will discuss several approaches to the Charney-Davis conjecture undertaken over the years. In particular, I will describe work of Gal that transforms the question by introducing an invariant derived from the f-vector called the "γ-vector". Gal's conjecture, which implies Charney-Davis, is that this γ-vector always consists of nonnegative integers. As always when faced with a mysterious collection of nonnegative integers, the natural question for the combinatorialist is: What does the γ-vector count?

In recent work with Eran Nevo (http://arxiv.org/abs/0909.0694) and Nevo and Bridget Tenner (http://arxiv.org/abs/1003.2544), we propose an answer to this question.

The talk will be accessible to graduate students and others with little background in the area.

This talk should be accessible to graduate students. 1321829447