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Lower bounds on the surface area of Voronoi polyhedra

One of the most beautiful problems related to 3-dimensional unit ball packings is the Dodecahedral Conjecture formulated by L. Fejes Tóth in 1943. It states that the minimal volume of a Voronoi cell in a 3-dimensional unit ball packing is at least as large as the volume of a regular dodecahedron of inradius 1. This problem has been recently settled in the affirmative by Hales and McLaughlin. K. Bezdek phrased the following generalized version of the Dodecahedral Conjecture in 2000. Strong Dodecahedral Conjecture: The minimum surface area of a Voronoi cell in a unit ball packing in \mathbb{E}^3 is at least as large as the surface area of the regular dodecahedron circumscribed about the unit ball.

In this talk, I will present a construction which yields a lower bound on the surface area of the Voronoi polyhedron. This result improves on existing lower bounds and provides further support for the Strong Dodecahedral Conjecture.

This work is joint with Gergely Ambrus.