Department of Mathematics and Statistics Colloquium

Circle-Polyhedra and a Classical Tale of Mathematical Cleverness

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Abstract: In 1813 Cauchy published his now celebrated proof that convex polyhedra are globally rigid–meaning, somewhat informally, that the local congruence of the faces of two convex polyhedra implies their global congruence. This beautiful proof relied, cleverly, on a split between a combinatorial result based on certain labelings of graphs on spheres, and a geometric one. More recently, the Koebe-Andre'ev-Thurston theorem has become a classic result in discrete geometric topology. It gave rise to the field of circle-packing, which provides a basis for a discrete theory of complex analysis. In this talk I weave these two stories, that of the celebrated rigidity theorem of Cauchy and the theorem of Koebe-Andre'ev-Thurston into a new result on the uniqueness of certain patterns of circles on the sphere, called c-polyhedra. This, in turn, has implications for the uniqueness of certain hyper-ideal polyhedra in hyperbolic (rather than Euclidean) space.

Monday, November 28 at 3:45 in Roop 103

refreshments at 3:30