TEXAS STATE UNIVERSITY

The rising STAR of Texas

Discrete Mathematics Seminar

Time: Friday, April 5, 2019, 2:15-3:15 PM
Room: 330 Derrick Hall
Title: Exposed circuits, linear quotients, and chordal clutters
Speaker: Dr. Anton Dochtermann, Department of Mathematics, Texas State University

Abstract:

Chordal graphs are widely studied combinatorial objects, with various characterizations and applications. They also appear in commutative algebra in the context of Froberg's theorem, which says that a graph G is chordal if and only if the edge ideal of its complement has linear resolutions. Recently Culbertson, Guralnik, and Stiller give a new characterization of chordal graphs in terms of what they call 'edge-erasures'. We show that these moves are in fact equivalent to a `linear quotient' ordering on the ideal, leading to an algebraic proof of their result. We consider higher-dimensional analogues and show that linear quotients for more general circuit ideals of d-clutters can be characterized in terms of removing `exposed circuits' in the complement clutter. Here a circuit is exposed if it is uniquely contained in a maximal clique, reminiscent of the free faces of simple homotopy theory. This leads to notions of higher-dimensional spanning trees and 'chordal clutters' which borrow from commutative algebra. We discuss an application to Simon's conjecture, which posits that the k-skeleta of a simplex are extendably shellable.