## Combinatorial applications of a fundamental set quintic of relations **Tim Huber** (University of Texas – Pan American)

## Abstract

In this lecture we apply properties of four quintic theta functions paralleling those of the classical Jacobi null theta functions. The quintic theta functions satisfy analogues of Jacobi's quartic theta-function identity and counterparts of Jacobi's Principles of Duplication and Dimidiation. The resulting library of quintic transformation formulas will be used to describe the action of Hecke operators of level five and more general quintic dissection operators. This machinery will be used to obtain interesting quintic multisections for Eisenstein series and related generating functions. Among the many consequences are Ramanujan's expansions for quintic dissections of the partition function and generalizations thereof. Central to our analysis is a new nonlinear coupled system of differential equations satisfied by the quintic theta functions.