1072-35-77 **Gregory Berkolaiko** and **Peter Kuchment***, kuchment@math.tamu.edu, and **Uzy Smilansky**. *Nodal counts of billiard eigenfunctions and critical partitions.*

In this talk we address the nodal count (i.e., the number of nodal domains) for eigenfunctions of Schroedinger operators with Dirichlet boundary conditions in bounded domains (billiards). The classical Sturm theorem claims that in dimension one, the nodal and eigenfunction counts coincide: the n-th eigenfunction has exactly n nodal domains. The Courant Nodal Theorem claims that in any dimension, the number of nodal domains of the n-th eigenfunction cannot exceed n. However, it follows from a stronger upper bound by Pleijel that in dimensions higher than 1 the equality can hold for only finitely many eigenfunctions. Thus, in most cases a "nodal deficiency" arises. Moreover, examples are known of eigenfunctions with an arbitrarily large index n that have just two nodal domains.

We show that, under some genericity conditions, the answer can be given in terms of a functional on an infinite dimensional variety of partitions of the billiard, whose critical points correspond exactly to the nodal partitions and Morse indices coincide with the nodal deficiencies. (Received June 19, 2011)