SAMSI-Berkeley Seminar

on Random Matrices and high-dimensional inference

11:00am, Friday, November 17th, 2006
Dwinelle Hall, Room 127

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Two Results about Large Random Matrices

We show that the properly scaled spectral measures of symmetric Hankel and Toeplitz matrices of size N by N generated by i.i.d. random variables of zero mean and unit variance converge weakly in N to universal, non-random, symmetric distributions of unbounded support, whose moments are given by the sum of volumes of solids related to Eulerian numbers. The universal limiting spectral distribution for large symmetric Markov matrices generated by off-diagonal i.i.d. random variables of zero mean and unit variance, is more explicit, having a bounded smooth density given by the free convolution of the semi-circle and normal densities.

Time permitting, I will also explain the formula for the large deviations rate function for the number of open path of length k in random graphs on $N \gg 1$ vertices with each edge chosen independently with probability $0 < p < 1$, and more generally, for the same functionals applied to any sequence of matrices with bounded i.i.d. entries. Using the same rationale, we can guess the rate functions for the number of simple cycles of length $k > 2$ in large random graphs, the derivation of which is yet an open problem.

This talk is based on joint works with Erwin Bolthausen, Wlodek Bryc, Francis Comets and Tiefeng Jiang.