1070-60-167 **Murat Kologlu*** (Murat.Kologlu@williams.edu), **Steven J Miller** (Steven.J.Miller@williams.edu) and **Gene Kopp**. *Distributions of Eigenvalues of Real Symmetric m-Circulant Matrices.*

Random matrix ensembles model many phenomena, from nuclear energy levels to L-function zeros. The idea is to generate $N \times N$ matrices from some nice distribution and look at their spectra. As $N \to \infty$, the behavior of the eigenvalues of a typical matrix is close to the ensemble average. However, few ensembles are well-understood, and current theorems rarely illustrate transitions between ensembles. We study real symmetric m-circulant matrices with entries i.i.d.r.v. An m-circulant matrix has toroidal diagonals periodic of period m. We view m as a dial we can turn from the highly structured real symmetric circulant matrices to the ensemble of all real symmetric matrices. The limiting eigenvalue densities p_m show a visually stunning convergence from a Gaussian to the semicircle as $m \to \infty$. We prove this convergence. We also prove that p_m is the product of a Gaussian and a certain even polynomial of degree $2m-2$. The proof is by derivation of the moments from the eigenvalue trace formula. The key step is converting the central combinatorial problem in the calculation to an equivalent problem about Euler characteristic and algebraic topology. This is joint work with Gene Kopp and Steven J. Miller. (Received February 09, 2011)