

1106-VQ-2164      **Xixi Edelsbrunner\*** ([xe1@williams.edu](mailto:xe1@williams.edu)), **Stephan Garcia**, **Kimsy Tor**, **Karl Winsor** and **Steven J Miller**. *Toward Combinatorial Proofs of the Sato-Tate Law and The Weil Bound For Kloosterman Sums*. Preliminary report.

We discuss progress toward elementary combinatorial proofs of the Sato-Tate law and the Weil bound for Kloosterman sums. We apply the classical moment method for probability distributions and the theory of polynomial Legendre sums to a family of matrices due to Fleming, Garcia and Karaali, whose eigenvalues are Kloosterman sums. Using interlacing arguments, we construct combinatorially tractable matrices whose eigenvalues closely approximate Kloosterman sums. By adapting a method of Bose and Sen for studying the eigenvalue distributions of structured random matrix ensembles, we can isolate the main terms of the moments of our eigenvalue distributions, which agree with those of the semicircle distribution. Our approach toward the Sato-Tate law and the Weil bound reduces to a bound on certain Legendre sums which can be related to families of elliptic curves. (Received September 15, 2014)