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Beyond the excised model: random matrix models and elliptic curves

There is much evidence to support the Katz-Sarnak philosophy in the case of a family of quadratic twists of an elliptic curve. That is, as the conductor, the parameter that orders the curves in the family, becomes large, the zeros of the associated L-functions behave statistically like the eigenvalues of matrices from the orthogonal group $O(N)$. In 2006 Steven J. Miller produced evidence that for finite conductor, statistics of zeros near the critical (symmetry) point in these families of L-functions are not well modelled by the group $O(N)$. The "excised model", a subset of matrices from $O(N)$, was proposed to remedy the discrepancy identified by Miller, but the model raises more questions than it resolves. Two of these questions will be investigated in this talk.