RAM MURTY, Queen's University

The Central Limit Theorem and Fourier coefficients of modular forms

In 1940, the central limit theorem inspired the discovery of the Erdos-Kac theorem dealing with the number of prime factors of a given number n. This theorem marked the beginning of probabilistic number theory. Subsequently, the subject has spawned new developments and insights into the nature of arithmetical functions. In the 1980's, Kumar Murty and I derived a version of the Erdos-Kac theorem to study the normal number of prime factors of $\tau(p)$ (p prime) and $\tau(n)$, where τ denotes the Ramanujan τ-function. Our work made use of Deligne's ℓ-adic representation attached to τ as well as the Chebotarev density theorem (with its strong error term modulo the generalized Riemann hypothesis). These results extend to Fourier coefficients of other eigenforms, with appropriate modifications. In this talk, I will report on some recent joint work with Arpita Kar dealing with the normal number of prime factors of shifts like $\tau(p+a)$. If time permits, I will report on related joint work with Neha Prabhu also inspired by the central limit theorem.