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Joint distributions of error terms for primes in arithmetic progressions modulo 11

In 1983, Bays and Hudson noted two surprising phenomena for the prime race mod 11. First, that the leading residue class seems to cycle through a pattern with only minor deviations; and secondly, that the trailing residue class tends to be the additive inverse of the leading one.

In this talk, I will discuss, assuming GRH and the Linear Independence of zeros of Dirichlet L -functions, a formula for the logarithmic density of the set of positive real numbers on which two prime counting functions $\psi(x; q, a)$ and $\psi(x; q, b)$ are simultaneously larger than their asymptotic main terms. This formula provides, when $q = 11$, a deeper mathematical explanation of the phenomena observed by Bays and Hudson. This is joint work with Kübra Benli and Greg Martin.