The sum of digits of primes

THU/EPCOS
10:30–10:50

*Michael Drmota** (TU Wien), *Christian Mauduit* (Univ. Marseille), *Joël Rivat* (Univ. Marseille)

It is relatively easy to show that the average number of non-zero binary digits of primes $< x$ is almost the same as the average number of non-zero binary digits of all natural numbers $< x$, namely $(1/2)\log_2 x + O(1)$.

The main purpose of this talk is to provide asymptotic expansions for the number of primes $< x$ with precisely k non-zero binary digits for k close to $(1/2)\log_2 x$.

The proof is based on a thorough analysis of exponential sums involving the sum-of-digits function (that is related to a recent solution of problem of Gelfond) and a refined central limit theorem for the sum-of-digits function of primes. Interestingly this result answers a question that is contributed to Ben Green whether for every given k there exists a prime with k non-zero binary digits. There is also a very nice relation to the Thue-Morse sequence.

[1] M. DRMOTA, C. MAUDUIT AND J. RIVAT: *Primes with an Average Sum of Digits*, Compositio Math., to appear.

[2] C. MAUDUIT AND J. RIVAT: *Sur un problème de Gelfond: la somme des chiffres des nombres premiers*, Ann. Math, to appear.