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Random Number Theory

No, this is not a talk about random numbers! Rather, we discuss the role of randomness in number theory, from Euler to the present. We'll visit the probabilistic background of Fermat's Last Theorem, the ABC conjecture, the Prime Number Theorem, the Riemann Hypothesis, Goldbach's Conjecture, and the Twin-Prime Conjecture, among other famous problems and results. We'll also discuss the influence of randomness in computational number theory. In combinatorial number theory, the Probabilistic Method (best known in graph theory and combinatorics) is used to prove the existence of strange structures. In algebraic number theory the probability-based Cohen–Lenstra heuristics lead us to conjectures (and theorems too) about the distribution of algebraic number fields. We close with the famous Covering Congruences problem of Paul Erdős, which was recently settled with probabilistic tools.