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Number of Prime Factors with a Given Multiplicity

For natural numbers $k, n \geqslant 1$, let $\omega_k(n)$ be the number of prime factors of n with multiplicity k. The functions $\omega_k(n)$ with $k \geqslant 1$ are refined versions of the well-known function $\omega(n)$ counting the number of distinct prime factors of n without any conditions on the multiplicities.

In this talk, we will cover several elementary, analytic and probabilistic results about the functions $\omega_k(n)$ with $k \geqslant 1$ and their function field analogues in polynomial rings with coefficients from a finite field. In particular, we will see that the function $\omega_1(n)$ and its function field analogue satisfy the Erdős-Kac Theorem. The results we will see in this talk are based on joint works with Yu-Ru Liu, with Sourabhashis Das, Wentang Kuo and Yu-Ru Liu, and with Greg Martin.