# Limit theorems for random Dirichlet series


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We consider a random Dirichlet series $F(\sigma) = \sum_{n=1}^{\infty} \frac{X_n}{n^\sigma}$ where $(X_n)_{n\in\mathbb{N}}$ are independent and identically distributed random variables. We assume that $\mathbb{E}(X_n) = 0$ and $\mathbb{E}(X_n^2) < \infty$, in which case the series converges almost surely for $\sigma > 1/2$. We are interested in the behaviour of $F(\sigma)$ as $\sigma$ approaches $1/2$. In this talk we will present two main results. Firstly, for the Rademacher case, we provide a precise description of the magnitude of the oscillations of $F(\sigma)$ as $\sigma \to 1/2^+$, by showing that it satisfies a Law of the Iterated Logarithm. In particular, this implies that, almost surely, $F(\sigma)$ has an infinite number of real zeros accumulating at $\sigma = 1/2$. Secondly, in the standard Gaussian case, we obtain a quantitative estimation of the asymptotic average number of real zeros of $F(\sigma)$ in the interval $(\tau, +\infty)$, as $\tau \to 1/2^+$. These results are a joint work with Marco Aymone and Susana Frómeta.