On tail behavior of infinite sums of independent indicators

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Let $Y = \sum_{k\geq 1} 1_{A_k}$ be an infinite sum of the indicators of independent events. This talk focuses on a precise (as opposed to logarithmic) first-order asymptotic behavior of the tail probabilities $\mathbb{P}\{Y \geq n\}$ and the point probabilities $\mathbb{P}\{Y = n\}$ as $n \to \infty$.

I present a reasonably complete classification of the asymptotic behaviors covering most cases of practical interest. These general results are then applied to specific examples where the success probabilities $r_k := \mathbb{P}(A_k)$ decay polynomially $r_k \sim ck^{-\beta}$ or (sub-, super-) exponentially $r_k \sim ce^{-k^{\beta}}$, yielding the asymptotic tail and point probabilities in explicit forms.

The talk is based on the recent joint work with Alexander Iksanov [1].

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[1] Iksanov A., Kotelnikova V., On tail behavior of infinite sums of independent indicators, 2026, 50 pp., arXiv:2602.08093.