

Probabilistic Operator Algebra Seminar

Organizer: Dan-Virgil Voiculescu

Monday, 9:00–10:30 am, to attend via Zoom email David Jekel (daj@math.ku.dk) remote

Oct 20 **Bartosz Kolodziejek and Kamil Szpojankowski**, Warsaw University of Technology

Free Perpetuities

The study of perpetuities – fixed points of affine-type distributional equations – has a long history in classical probability, with connections to random walks, branching processes, and heavy-tailed distributions. In this talk, we will present a free probabilistic analogue of this theory, where the fixed-point equation is interpreted in terms of free independence. The first part of the talk will focus on the free multiplicative random walk underlying the problem. We will discuss how the asymptotics of moments under free multiplicative convolution govern the behavior of potential solutions, and explain how these tools allow us to establish the existence of free perpetuities. The second part of the talk will turn to a finer analysis of the distributional tails of free perpetuities. Using subordination techniques for free convolution, we will describe precise asymptotic estimates for one-sided and symmetric cases. These estimates reveal a power-law decay in the critical case, reminiscent of Kesten’s theorem in the classical setting, but with genuinely free-probabilistic features.