

Non-commutative Neveu decomposition and associated ergodic theorems

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In this talk, we begin by discussing the Neveu decomposition for actions of locally compact amenable semigroups of positive contractions on semifinite von Neumann algebras. We then consider a dynamical system (M, G, α) , where M is a finite von Neumann algebra equipped with a faithful normal trace τ , G is a locally compact group of polynomial growth with a symmetric compact generating set V , and α is an action of G on M that preserves a given state.

We demonstrate that the ergodic averages associated with the predual action on $L^1(M, \tau)$, corresponding to the Følner sequence $\{V_n\}_{n \in \mathbb{N}}$, converge bilaterally almost uniformly. In the course of the analysis, we also establish an intermediate maximal ergodic inequality. The talk concludes with a discussion of a stochastic ergodic theorem combining Neveu decomposition and obtained pointwise ergodic theorem.