



Mathematics > Dynamical Systems

Ergodicity of Poisson products and applications

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In this paper we study the Poisson process over a σ -finite measure-space equipped with a measure preserving transformation or a group of measure preserving transformations. For a measure-preserving transformation T acting on a σ -finite measure-space X , the Poisson suspension of T is the associated probability preserving transformation T_* which acts stationarily on realization of the Poisson process over X . We prove ergodicity of the Poisson-product $T \times T_*$ under the assumption that T is ergodic and conservative. We then show, assuming ergodicity of $T \times T_*$, that it is impossible to deterministically perform natural equivariant operations: thinning, allocation, or matching. In contrast, there are detailed results in the literature demonstrating the existence of isometry equivariant thinning, matching and allocation of homogenous Poisson processes on \mathbb{R}^d . We also prove ergodicity of the "first return of left-most transformation" associated with a measure preserving transformation on \mathbb{R}_+ , and discuss ergodicity of the Poisson-product of measure preserving group actions, and related spectral properties.

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