Lévy 2016 Summer School on Lévy processes

ALPHA-PERMANENTAL PROCESSES

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We will introduce the class of α-permanental point processes, also called α-determinantal point processes. This class contains the determinantal point processes, the Poisson point processes and the permanental point processes. We will analyse this class from the point of view of infinite divisibility.

We will then concentrate on the intersection of the class of α-permanental processes and the class of Cox processes. Each element of this intersection is connected to an α-permanental real process which represents its intensity. α-permanental real processes are characterized by the fact that their joint moments are given by α-permanents of matrices. The most known and used α-permanental real processes are the squared Gaussian processes (i.e. $(\eta_x^2, x \in I)$ for $(\eta_x, x \in I)$ centered Gaussian process). The law of the configurations of bosons in standard conditions belongs to this intersection.

A sufficient condition for a Cox process to be infinitely divisible is the infinite divisibility of its intensity. We will characterize the infinitely divisible α-permanental real processes. Each infinitely divisible α-permanental real process can be associated to a transient Markov process. This connection will be exploited to construct extensions of Dynkin's isomorphism Theorem. We will then detail some applications of these identities to Lévy processes.