

Workshop in Stochastic Analysis and Applications

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Recent developments in stochastic calculus via regularizations with jumps and applications to BSDEs.

Abstract

The aim of this talk consists in mentioning recent developments about stochastic calculus via regularizations for jump processes. We recall that a *weak Dirichlet process* X with respect to a given underlying filtration is the sum of a local martingale and a process A such that $[A, N] = 0$ for every continuous local martingale. We introduce the notion of special weak Dirichlet process; whenever such a process is a semimartingale, then it is a special semimartingale. We will provide conditions on a function $u: [0, T] \times \mathbb{R}^d \rightarrow \mathbb{R}$ and on an adapted cadlag process S such that $u(t, S_t)$ is a special weak Dirichlet process. Two applications will be discussed.

1. The existence of a (strong) solution of a BSDEs with distributional driver, with underlying Brownian filtration (with Elena Issoglio, Leeds).
2. Consider the case a BSDE driven by a random measure: a solution is a triplet (Y, Z, K) where K is a random field. The function $u(s, x) := Y_s^{s,x}$ is deterministic. If u has some minimal regularity, the calculus will allow to link Z, K to u (with Elena Bandini, Milano Bicocca).