The pathwise uniqueness of solution to a SPDE driven by α-stable noise

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Abstract: In this talk we study the pathwise uniqueness of solution to the following stochastic partial differential equation

$$\frac{\partial X_t(x)}{\partial t} = \frac{1}{2}\Delta X_t(x) + X_{t-}(x)^{\beta}\dot{L}_t(x), \quad t > 0,\ x \in \mathbb{R},$$

where $1 < \alpha < 2$, $0 < \beta < 1$ and $\dot{L}$ denotes an α-stable white noise on $\mathbb{R}_+ \times \mathbb{R}$ without negative jumps. In the special case of $\alpha\beta = 1$, where solution to the above equation is the density of a super-Brownian motion with α-stable branching (see Mytnik (2002)), our result leads to its pathwise uniqueness for $1 < \alpha < 4 - 2\sqrt{2}$. The local Hölder continuity of the solution is also obtained for fixed time $t > 0$ and $\alpha\beta \neq 1$.

This talk is based on a joint work with Xiaowen Zhou.