

Invertibility of functionals of the Poisson process and applications

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Joint work with L. Coutin

Solving the SDE $dX(t) = r(X(t))dt + dB(t)(1)$ is equivalent to invert the map $B \mapsto B(t) - \int_0^t r(B(s))ds$. We study the analog of this problem on the Poisson space. Because of the Girsanov Theorem, it turns out that the equivalent problem consists in inverting a time change.

We can then reinterpret the solution of the generalized Hawkes problem (find a self-excited point process for a given compensator) as the analog to solving an SDE like (1). We then show a Yamada-Watanabe like theorem for weak and strong solutions to the Hawkes problem.

Some relationships are also established between Hawkes processes and directed transport between point processes.

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