Application of the Lent Particle Method to Poisson Driven SDEs

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We apply the Dirichlet forms version of Malliavin calculus to stochastic differential equations with jumps. As in the continuous case this weakens significantly the assumptions on the coefficients of the SDE. In spite of the use of the Dirichlet forms theory, this approach brings also an important simplification which was not available nor visible previously : an explicit formula giving the carré du champ matrix, i.e. the Malliavin matrix. Following this formula a new procedure appears, called the *lent particle method* which shortens the computations (this method will be introduced in a first talk by N. Bouleau). We obtain existence of density for solutions of sde's of the form:

$$X_t = x + \int_0^t \int_X c(s, X_{s^-}, u)\tilde{N}(ds, du) + \int_0^t \sigma(s, X_{s^-})dZ_s \quad (1)$$

where $\tilde{N}$ is a Poisson measure and Z a semi-martingale. We also consider concrete examples based on the Lévy area.