Critical nonlinearities in multifractal Levy conservation laws

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Let $-{\cal L}$ be the generator of a L\'evy semigroup on $L^1(R^n)$ and $f: R\to R^n$ be a nonlinearity. I will discuss the framework for studying solutions, symptotics, and controlled Monte-Carlo-type interacting particle approximations for the L\'evy conservation law $u_t+{\cal L}u+\nabla\cdot f(u)=0$, which also can be interpreted as a Fokker-Planck equation for a "nonlinear McKean diffusion" associated with certain stochastic differential equations driven by L\'evy stochastic processes. In a particular case of multifractal conservation laws involving stable processes and fractional Laplacians the properties of the equations depend on a subtle interplay between the multifractality parameters and the nonlinearity. Applications to interfacial growth models will be described
. (Joint work with T. Funaki, P. Biler and G. Karch)