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Particle Systems and a Class of Diffusions with Jumps

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We construct a class of jump-diffusions where the jump is triggered by contact with a catalytic set, with the most important case being the boundary of a domain in $\mathbb{R}^d$. Examples of particle systems are a Fleming-Viot branching mechanism and a Bak–Sneppen fitness model. We discuss ergodicity and scaling limits in a general framework. In special cases one of the most difficult question is whether the system properly exists (is non-explosive). For a sufficient number of particles N the answer is positive, and some explicit calculations are shown when $N = 2$.

This is joint work with Min Kang from North Carolina State University.