

# LIMIT THEOREMS FOR SOME SUPERCRITICAL SUPERPROCESSES

Yan-Xia Ren *Peking University, China*

**Renming SONG** *University of Illinois, USA*, E-mail: rsong@illinois.edu

Rui Zhang *Capital Normal University, China*

**Abstract:** Let  $X = \{X_t\}$  be a supercritical superprocesses in a space  $E$ . Let  $\lambda_0 > 0$  be the first eigenvalue of the mean semigroup of  $X$  and let  $\phi_0$  be a positive eigenfunction corresponding to  $\lambda_0$ . Then  $M_t := e^{-\lambda_0 t} \langle \phi_0, X_t \rangle$  is a nonnegative martingale. Let  $M_\infty := \lim_{t \rightarrow \infty} M_t$ . It is known that  $M_\infty$  is nondegenerate iff the  $L \log L$  condition is satisfied. In this talk I will present some recent result in the case when the  $L \log L$  condition is not satisfied. We prove that there is a non-trivial family of backward iterates  $\gamma_t$  and a non-degenerate random variable  $W$  such that for any  $\mu \in \mathcal{M}_F(E)$ ,

$$\lim_{t \rightarrow \infty} \gamma_t \langle \phi_0, X_t \rangle = W, \quad \text{a.s.-}\mathbf{P}_\mu.$$

We also give the almost limit of  $\gamma_t \langle f, X_t \rangle$  for general test function  $f$ .