

# Spectral gap for multi-species exclusion processes

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In this talk, we study multi-species exclusion process. The process is regarded as a gas of multi-species particles. We give a reasonable sufficient condition for the local ergodicity of the dynamics. Under the local ergodicity assumption, we prove that the spectral gap of multi-species exclusion process is bounded above by  $C_1\rho_0n^{-2}$  and below by  $C_2\rho_0n^{-2}$ , where  $C_1, C_2$  is independent of  $n$  and number of particles and  $\rho_0$  is the density of the vacant site. Furthermore, we study multi-species exclusion process with site disorder. Under the local ergodicity assumption, we prove that the spectral gap of multi-species exclusion process with site disorder is bounded below by  $C\rho_0n^{-2}$ , where  $C$  is independent of  $n$  and number of particles and  $\rho_0$  is the density of the vacant site.