Title: Universality for multi-component stochastic systems

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We study the equilibrium fluctuations of an interacting particle system evolving on the discrete ring $\mathbb{T}_N$ with three species of particles that we name A,B and C, subject to the exclusion rule: at each site there is only one particle. The interaction rates depend on the type of particles involved via three constants EA,EB and EC, and on the size of the system. This model can be seen as a multi-species generalisation of the weakly asymmetric simple exclusion process. We analyse proper choices of the density fluctuation fields associated to the conserved quantities (the densities of particles for each species), that are given by linear combinations of the fields that match those from nonlinear fluctuating hydrodynamics theory [1]: we show that they converge, in the limit $N \to \infty$, to a system of stochastic partial differential equations, that, according to the asymmetry of the jumps, can either be the Ornstein–Uhlenbeck equation or the Stochastic Burgers' equation. Based on a joint work with G. Cannizzaro, P. Gonçalves and R. Misturini.

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References

[1] Spohn, H. Nonlinear Fluctuating Hydrodynamics for Anharmonic Chains Journal of Statistical Physics, 154.5, 1191–1227 (2014).