# Generalized Young measures and the hydrodynamic limit of condensing zero-range processes

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**Abstract**

Zero-range processes are stochastic interacting particle systems with zero range interaction. For particular choices of their parameters they exhibit phase separation with the emergence of a condensate. Such zero-range processes are referred to as condensing and their hydrodynamic limit is not known. It is expected to be given by a degenerate nonlinear diffusion equation where the diffusivity vanishes at densities that exceed a critical density $\rho_c$. In this talk we employ an appropriate generalization of the notion of Young-measures in order to obtain the hydrodynamic limit of such equations. More precisely, we focus on symmetric processes on the discrete torus and prove that in the hydrodynamic limit the law of the Young-empirical density of the diffusively rescaled zero-range process is concentrated on generalized Young measure-valued weak solutions $\boldsymbol{\pi} = (\boldsymbol{\pi}_t)_{t\geq 0}$ of the degenerate parabolic equation $\partial_t \boldsymbol{\pi} = \Delta\Phi(\boldsymbol{\pi})$. Here $\Phi(\rho)$, $\rho \geq 0$, is the mean local jump rate of particles under the grand canonical equilibrium state of density $\min\{\rho, \rho_c\}$.