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Minimizing non local functionals on measures. Relaxation and asymptotics.

lundi 16 janvier 2023 11:00 (1 heure)

Optimization problems on probability measures in $\mathbb{R}^d$ are considered where the cost functional involves multi-marginal optimal transport. In a model of N interacting particles, the interaction cost is repulsive and described by a two-point function $c(x,y) = \ell(|x-y|)$ where $\ell : \mathbb{R}_+ \to [0,\infty]$ is decreasing to zero at infinity. Due to a possible loss of mass at infinity, non existence may occur and relaxing the initial problem over sub-probabilities becomes necessary. In this talk we will describe the relaxed functional to be minimized as well as its $\Gamma-$limit as $N \to \infty$. Then we study the limit optimization problem when a continuous external potential is applied. Conditions are given with explicit examples under which minimizers are probabilities or have a mass < 1 . In a last part we consider the case of a infinitesimal range interaction cost $\ell_N(r) = \ell(r/e)$ ($e \ll 1$) with the aim of determining the mean-field limit energy as $e \to 0$ of a very large number N_e of particles confined in a given compact subset of $\mathbb{R}^d$.

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