

SEMINAR

CAPDE

EXPOSITOR

Mircea Petrache
PUC, Chile

Title

Asymptotics for Optimal Transport between N-ples of points, with cost given by electrostatic interaction energy

Abstract: Consider the optimal transport problem N-ples of points, in which the transport cost between N points equals an electrostatic-type energy such as $\sum_{i \neq j} |x_i - x_j|^{-s}$ with $0 < s < d$. We are led to a minimization problem for probability measures on $(\mathbb{R}^d)^N$, which is an N-marginal Optimal Transport problem, and has a direct physical interpretation.

We prove the sharp large-N asymptotics for the above N-marginal transport problem at second order, namely beyond the mean-field continuum limit. To this aim we establish a general finite-range decomposition technique into positive-definite contributions, extending a paper by Fefferman from 1985. This kind of decomposition seems interesting to study in itself and may have further applications.

Our questions also appear in Density Functional Theory, an important model used in computational chemistry and material science (1998 Nobel prize for W. Kohn). Mathematically, our problem represents a link between the study of ground states for classical and quantum gases. The techniques of the proof give a new viewpoint on wavelet-type decompositions, here applied within optimal transport theory.

Our description of asymptotics (a) can also be seen as an Optimal Transport parallel to, and (b)

gives a new angle on, the study of asymptotics for Coulomb and Riesz gases, as done by Serfaty and collaborators.

Monday May 7, 2018, 16:10 hrs.

Sala de Seminarios Felipe Álvarez Daziano 5to piso del DIM