LARGE DEVIATIONS, GAMMA-CONVERGENCE AND LARGE SCALE COMPUTATIONS FOR THE SIMULATION OF THE EARLY UNIVERSE

YANN BRENIER

The Peebles model of the early universe can be approximated by using the Monge-Ampère equation instead of the Poisson equation to recover the gravitational potential.

The corresponding Monge-Ampère gravitational model can be derived, at the discrete level of a finite number of particles (a particle being a cluster of galaxies!), from the purely stochastic model of a Brownian cloud, through large deviation and Gamma-convergence methods. (Joint work with Luigi Ambrosio and Aymeric Baradat).

Large scale computations have been recently performed at the Institut d'Astrophysique de Paris, with up to 512**3 particles, thanks to Bruno Lévy's 3D version of Mérigot's semi-discrete solver for the Monge-Ampere equation.

(Joint work with Pierre Boldrini, Bruno Lévy and Roya Mohayaee.)