

JOINT CMU-PITT COLLOQUIUM

FRIDAY, DECEMBER 2, 2016

FRICK FINE ARTS BUILDING

4:00 P.M.

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**MICROSCOPIC DESCRIPTION OF
COULOMB TYPE SYSTEMS**

ABSTRACT: We are interested in systems of points with Coulomb, logarithmic or more generally Riesz interactions (i.e. inverse powers of the distance). They arise in various settings: an instance is the classical Coulomb gas which in some cases happens to be a random matrix ensemble, another is vortices in the Ginzburg-Landau model of superconductivity, where one observes in certain regimes the emergence of densely packed point vortices forming perfect triangular lattice patterns named Abrikosov lattices, a third is the study of Fekete points which arise in approximation theory. After reviewing the motivations, we will take a point of view based on the detailed expansion of the interaction energy to describe the microscopic behavior of the systems. In particular a Central Limit Theorem for fluctuations and a Large Deviations Principle for the microscopic point processes are given.

This allows to observe the effect of the temperature as it gets very large or very small, and to connect with crystallization questions. The main results are joint with Thomas Lebl and also based on previous works with Etienne Sandier, Nicolas Rougerie and Mircea Petrache.

Reception immediately following the Colloquium