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**The statistical mechanics of Coulomb and Riesz gases: a
variational approach**

Abstract

We are interested in the asymptotics for large systems of points interacting via Riesz kernels (including Coulomb cases), with or without temperature. Motivations come from approximation theory, physics, and random matrices. While the leading order behavior of such systems is well understood, a next order Gamma-convergence type analysis allows to describe the microscopic scale behavior of such systems. This is based on works with Etienne Sandier, Nicolas Rougerie, Simona Rota Nodari, Mircea Petrache and Thomas Leblé.