Spatial statistics for non-interacting trappes Fermi gases and random matrix theory

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Abstract

The interest for non-interacting trapped Fermi gases has been recently renewed by the mapping of these problems in one dimension and at zero temperature to Random Matrix Theory (RMT) [1,2]. In particular, while semi-classical techniques such as local density approximation allow to describe the bulk of the Fermi gas, they fail to describe the edge where the density of particle vanishes. These RMT techniques allow to obtain precise predictions for the correlations at the edge. Remarkably, these properties are universal with respect to a large class of confining potentials [3]. These results were extended both to higher dimension $d> 1$ and to finite temperature $T> 0$ using the framework of determinantal point processes [3]. After reviewing briefly these cases, I will present our recent work a new universality class including for instance the hard box potential [4].

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