

AG Zufallsmatrizen

Seminar

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Radial statistics in the two-dimensional one-component plasma and associated phase transitions

The two-dimensional one-component plasma is an ubiquitous model in statistical physics. For special values of the coupling constant βq^2 (where q is the particles charge and β the inverse temperature), the model also corresponds to the eigenvalues distribution of normal matrix models. I will discuss several features of the system - in the limit of large number N of particles for generic values of the coupling constant. I show that the statistics of a certain class of radial observables produces a rich phase diagram: their asymptotic behaviour in terms of large deviation functions is calculated explicitly, including next-to-leading terms up to order $1/N$. I will discuss a split-off phenomenon associated to atypical fluctuations of the edge density profile, and show explicitly that a failure of the fluid phase assumption of the plasma can break a genuine $1/N$ -expansion of the free energy. An outlook on the problem of spatially constrained Coulomb gas systems in any dimensions and universality of the associated third-order phase transition will also be offered.

Wednesday, 25.01.2017, 14:15 Uhr
V3-201