

Large deviations for ideal quantum systems

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We consider a general d -dimensional quantum system of non-interacting particles, with suitable statistics, in a very large (formally infinite) container. We prove that, in equilibrium, the fluctuations in the density of particles in a subdomain of the container are described by a large deviation function related to the pressure of the system. That is, untypical densities occur with a probability exponentially small in the volume of the subdomain, with the coefficient in the exponent given by the appropriate thermodynamic potential. Furthermore, small fluctuations satisfy the central limit theorem.