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Sommario/riassunto

In this paper the authors study mesoscopic fluctuations for Dyson's Brownian motion with $\beta=2$. Dyson showed that the Gaussian Unitary Ensemble (GUE) is the invariant measure for this stochastic evolution and conjectured that, when starting from a generic configuration of initial points, the time that is needed for the GUE statistics to become dominant depends on the scale we look at: The microscopic correlations arrive at the equilibrium regime sooner than the macroscopic correlations. The authors investigate the transition on the intermediate, i.e. mesoscopic, scales. The time scales that they consider are such that the system is already in microscopic equilibrium (sine-universality for the local correlations), but have not yet reached equilibrium at the macroscopic scale. The authors describe the transition to equilibrium on all mesoscopic scales by means of Central Limit Theorems for linear statistics with sufficiently smooth test functions. They consider two situations: deterministic initial points and randomly chosen initial points. In the random situation, they obtain a transition from the classical Central Limit Theorem for independent random variables to the one for the GUE.
