

27th Rencontres ITZYKSON : Fluctuations far from Equilibrium



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David MUKAMEL - Local drive (a pump or a battery) in interacting diffusive systems

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The long-range nature of the effect of a pump or a battery on an interacting diffusive fluid is discussed. It is shown that off criticality the pump generates long-range modulation in the density profile of the form of a dipolar electric potential and a current profile in the form of a dipolar electric field. The density profile is drastically modified when the fluid is at its critical point: here, in addition to the long-range influence of the current generated by the battery, the fluid is dominated by its intrinsic long-range critical correlations. It is demonstrated that the resulting density profile is of the same form as that of a fluid in equilibrium but under the influence of dipolar ordering field. As a result, the density profile at criticality can be expressed in terms of the equilibrium critical exponents of the fluid. In contrast, the current is shown to retain its off-critical dipolar field form.

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