MECCANICA
A CONFERENCE IN HONOR OF SANDRO GRAFFI ON HIS 65TH BIRTHDAY

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LONG RANGE CORRELATIONS IN DIFFUSIVE SYSTEMS

Long range correlations are a generic feature of nonequilibrium steady states and have been observed esperimentally. This phenomenon can be demonstrated in microscopic models but can also be derived from simple postulates characterizing the macroscopic behavior of diffusive systems. One of the postulates is the Einstein relationship among transport coefficients. A general theorem then excludes these correlations in equilibrium states, even if inhomogeneous such as, e.g., sedimentation equilibrium in centrifugal or gravitational fields. There exist, however, as pointed out by Joel Lebowitz, David Mukamel and others, some equilibrium models that exhibit long range correlations. A simple analysis shows that in these cases the Einstein relationship fails.