ICTS Statistical Physics Journal Club Seminar

Title : Dynamics of coupled modes for sliding particles on a fluctuating landscape

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Date : Thursday, 24 September 2020

Time : 03:00 pm (IST)

Abstract : The recently developed formalism of nonlinear fluctuating hydrodynamics (NLFH) has been instrumental in unraveling many new dynamical universality classes in coupled driven systems with multiple conserved quantities. In principle, this formalism requires knowledge of the exact expression of locally conserved current in terms of local density of the conserved components. However, for most nonequilibrium systems an exact expression is not available and it is important to know what happens to the predictions of NLFH in these cases. In this talk I will address this question for a system with coupled time evolution of sliding particles on a fluctuating energy landscape. In the disordered phase this system shows short-ranged correlations, this system shows short-ranged correlations, the exact form of which is not known, and so the exact expression for current cannot be obtained. We use approximate expressions based on mean-field theory and corrections to it, to test the prediction of NLFH using numerical simulations. In this process we also discover important finite size effects and show how they affect the predictions of NLFH. We find that our system is rich enough to show a large variety of universality classes. From our analytics and simulations we have been able to find parameter values which lead to diffusive, Kardar-Parisi-Zhang (KPZ), 5/3 Lévy and modified KPZ universality classes. Interestingly, the scaling function in the modified KPZ case turns out to be close to the Prähofer-Spohn function which is known to describe usual KPZ scaling. Our analytics also predict the golden mean and the 3/2 Lévy universality classes within our model but our simulations could not verify this, perhaps due to strong finite size effects.

Venue : Online Seminar (Join the Google Meet)

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