



Physics Colloquium

Tuesday, 29 November 2022 at 17:00

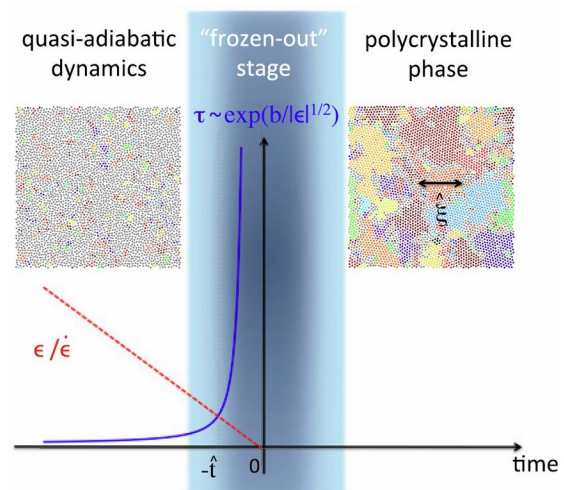
PD Dr. Peter Keim

MPI Dynamik und Selbstorganisation

Spontaneous symmetry breaking far of equilibrium Kibble-Zurek mechanism for a Kosterlitz-Thouless ensemble

Can a symmetry be broken globally in the thermodynamic limit? Tom Kibble stated that this is not the case, and postulated structure formation and a locally broken symmetry in the primordial Higgs field shortly after Big-Bang. Regions which are not connected by causality – since they cannot "communicate" about a global order parameter even with the speed of light – can not necessarily gain the same expectation value of the symmetry broken field. This results in domains and topological defects like grain boundaries, strings and monopoles. Wojciech Zurek applied this idea to quantum fluids (e.g. superfluid Helium), and predicted normalfluid vortices within the superfluid Helium below the lambda-transition.

In this colloquium I present the formation of topological defects within a two-dimensional colloidal ensemble, monitored by standard video microscopy. In equilibrium, this 2D ensemble reproduces the predictions of Mike Kosterlitz and David Thouless (Nobelprize 2016 for 2D melting). Out of equilibrium, the scaling law for defect formation (as function of cooling rate) follows exactly the prediction of Kibble and Zurek when adopted for the Kosterlitz-Thouless universality.



Venue: Hörsaal für Theoretische Physik, Linnéstraße 5

Before the lecture we offer coffee in front of the lecture hall.