Center for Soft Matter and Biological Physics

Discussion Meeting

Prof. Michel Pleimling

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"Dynamic phase transitions in the Ising ferromagnet: bulk and surface phase diagrams"

Friday, December 04, 2020

4:00pm - 5:00pm

Virtual Zoom Link: https://virginiatech.zoom.us/j/87140476848

An interesting type of non-equilibrium criticality is encountered when kinetic ferromagnets are subjected to a periodically oscillating magnetic field. When increasing the frequency of the field, a phase transition takes place between a dynamically disordered phase at low frequencies, where the ferromagnet is able to follow the changes of the field, and a dynamically ordered phase at high frequencies, where the magnetic system does not have time to adjust to the magnetic field before it changes its orientation. In this talk I discuss the bulk and surface properties of this dynamic phase transition. For bulk systems this non-equilibrium phase transition belongs to the universality class of the equilibrium three-dimensional Ising model. We find, however, that the non-equilibrium surface exponents do not coincide with those of the equilibrium critical surface. Whereas the resulting non-equilibrium surface phase diagram strongly resembles the corresponding equilibrium phase diagram, with an ordinary transition, an extraordinary transition and a surface transition, for weak surface couplings the non-equilibrium surface does not order. These results indicate that our understanding of the role played by surfaces in non-equilibrium systems, and more specifically at non-equilibrium phase transitions, is far from being complete.