April 16th, 2018
KAP 414
2:00 P.M. – 3:00 P.M.

Professor Amarjit Budhiraja

(University of North Carolina)

"Large Deviations from the Hydrodynamic Limit for a System with Nearest Neighbor Interactions"

Abstract: We give a new proof of the large deviation principle from the hydrodynamic limit for the Ginzberg-Landau model studied in Donsker and Varadhan (1989) using techniques from the theory of stochastic control and weak convergence methods. The proof is based on characterizing subsequential hydrodynamic limits of controlled diffusions with nearest neighbor interaction that arise from a variational representation of certain Laplace functionals. The approach taken here does not require superexponential probability estimates, estimation of exponential moments, or an analysis of eigenvalue problems, that are central ingredients in previous proofs. Instead, proof techniques are very similar to those used for the law of large number analysis, namely in the proof of convergence to the hydrodynamic limit (cf. Guo, Papanicolaou, Varadhan (1988)). Specifically, the key step in the proof is establishing suitable bounds on relative entropies and Dirichlet forms associated with certain controlled laws. This general approach has the promise to be applicable to other interacting particle systems as well and to the case of non-equilibrium starting configurations, and to infinite volume systems.