Hyperbolic $O(N)$ linear sigma model and its mean-field limit

报告人: 刘劭

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摘要: In this talk, we study the hyperbolic $O(N)$ linear sigma model on the two-dimensional torus, namely, a coupled system of N interacting stochastic damped nonlinear wave equations (SdNLW) with cubic nonlinearities, forced by space-time white noises. After briefly going over its well posedness, we prove that the hyperbolic O(N) linear sigma model converges to the mean-field SdNLW as N tends to infinity in two different settings: (i) with deterministic initial data and (ii) with invariant Gibbs measure initial data. One of the main difficulty of this problem comes from the roughness of the white noises. In a recent work (2022), Shen-Smith-Zhu-Zhu studied the parabolic counterpart of this problem. In our wave setting, however, due to the lack of the strong parabolic smoothing, new difficulty arises and I plan to explain how to overcome this issue.

This is a joint work with Ruoyuan Liu (University of Bonn) and Tadahiro Oh (University of Edinburgh).

报告人简介: 刘劭，德国波恩大学博士。

主办单位：北京理工大学数学与统计学院
School of Mathmatics and Statistics, Beijing Institute of Technology