YOUZHOU ZHOU, Zhongnan University of Economics and Law

Some Large Deviation Principles and Law of Large Numbers for Random Energy Model

Random Energy Model (in short REM) is a toy model for spin glasses, a special state for magnetic materials below a critical temperature T_c. The Poisson-Dirichlet distribution $P(\alpha, 0)$, where $\alpha = \frac{T}{T_c}$, indicates the probability weights of infinitely many pure states in REM. In this talk, large deviations for $P(\alpha, 0)$ as $T \to T_c (i.e. \alpha \to 1)$ is considered. Moreover, we will also consider large deviations for

$$\pi_{\alpha,\lambda}(dp) = C_{\alpha,\lambda} \exp\left\{\lambda(\alpha) \sum_{i=1}^{\infty} p_i^2\right\} PD(\alpha, 0)(dp),$$

where $C_{\alpha,\lambda}$ is a normalizing constant and $\alpha \to 1$. Here $\pi_{\alpha,\lambda}$ resembles the Poisson-Dirichlet distribution with selection in population genetics. Interestingly the large deviations for $\pi_{\alpha,\lambda}$ reveals phase transition. The weak law of large numbers in critical case is also covered in this talk.