Aging of mean-field spin glasses

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At a microscopic level spin glasses are strongly disordered correlated systems that undergo a liquid to solid transition upon appropriate cooling but without any apparent order emerging and the resulting solids are never observed in equilibrium in laboratory experiments – instead, they undergo a slow relaxation dynamics with peculiar universal properties that physicists have termed *aging*.

The aging phenomenon opened a wealth of new problems of probability theory in connection with Markov jump processes in highly disordered random environments. The analysis of several models and dynamics in the past 15 years allowed to isolate a general mechanism that relates aging to the classical *arcsine law* for stable subordinators through the asymptotic behavior of a partial sum process called *clock process*. This links aging to some of the most classical parts of probability, namely, extreme value theory, limit theorems for sums of correlated random variables, and Lévy processes.

In this talk, I will give an overview of the current knowledge on aging of mean-field spin glasses (the REM, the p-spin SK models, the GREMs) and succinctly present the state of the art techniques that have recently allowed to understand aging of Metropolis dynamics of the REM.

References

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