Recent progress on the thermodynamic formalism of random transformations

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The thermodynamic formalism of smooth dynamical systems was initiated in the mid seventies by Sinai, Ruelle and Bowen in the context of uniformly hyperbolic diffeomorphisms and flows. In this context, the existence of finite Markov partitions allows to semi-conjugate these dynamical systems to subshifts of finite type, where the original ideas from statistical mechanics found fertile ground and allowed to construct invariant Gibbs probability measures for H"older continuous potentials. Such measures turn out to attain the topological complexity of the dynamical system and are called equilibrium states. In this deterministic context, the fine properties of equilibrium states (e.g. speed of mixing, limit theorems, large deviations, etc) can be obtained from the description of the spectrum of transfer operators. Random dynamical systems offer a plethora of applications, serving as model for dynamical systems with noise and dynamics of semigroup actions just to mention two of them. In comparison to the deterministic counterpart, a single transfer operator gives rise to transfer operator cocycles whose random compositions need to be understood. This explains why the ergodic theory of random dynamical systems remains quite unexplored beyond the realm of the uniformly hyperbolic setting. In this talk we shall discuss some recent progress on the thermodynamic formalism of random transformations that exhibit some non-uniform hyperbolicity.