

# Multiple levels of replica symmetry breaking

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What does a random smooth function look like in high-dimensions? How many peaks, saddles or critical values of given index at a given energy level? What can be said about the topology of its level sets? In this talk, we will address these questions by looking at the low temperature limit of the Gibbs measure of spin glass models. In particular, we will provide the first examples of two-step replica symmetry breaking (2-RSB) models for the spherical mixed  $p$ -spin glass. These examples largely contrast with an early prediction that random functions could be classified into two different categories: one-step replica symmetry breaking (1RSB) or full-step replica symmetry breaking (FRSB).

Based on joint works with Qiang Zeng (Northwestern).