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Ensemble Inequivalence in Spin Glasses ZSOLT BERTALAN, HIDETOSHI NISHIMORI, KAZUTAKA TAKAHASHI, Tokyo Institute of Technology — We report on the ensemble inequivalence in many-body spin-glass models with Ising and integer spins. In the Ising case, for many-body interactions the transition between the ferromagnetic and paramagnetic phases is of first order, and the microcanonical and canonical ensembles give different results. The spin-glass transition is of first order for certain values of the crystal field strength in the integer-spin model and is dependent whether it was derived in the microcanonical or the canonical ensemble. We also discuss the ensemble inequivalence of random energy models, corresponding to the limit infinitely many-body interactions. This is the first systematic treatment of spin glasses with long-range interactions in the microcanonical ensemble using the replica approach, which shows how the two ensembles give different results.

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