

MATHEMATICAL ASPECTS OF MEAN FIELD SPIN GLASS THEORY

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A comprehensive review will be given about the rich mathematical structure of mean field spin glass theory, mostly developed, until now, in the frame of the intuitive methods of theoretical physics. Central to our treatment is a powerful interpolation method, allowing to compare different probabilistic schemes. In this way we can prove the existence of the thermodynamic limit, a long standing open problem, and show the emergency of Derrida-Ruelle random probability cascades. All these results seem to be in full agreement with the mechanism of spontaneous replica symmetry breaking as developed by Giorgio Parisi.