

A note on Talagrand's positivity principle

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Abstract

Talagrand's positivity principle states that one can slightly perturb a Hamiltonian in the Sherrington-Kirkpatrick model in such a way that the overlap of two configurations under the perturbed Gibbs' measure will become typically nonnegative. In this note we observe that abstracting from the setting of the SK model only improves the result and does not require any modifications in Talagrand's argument. In this version, for example, positivity principle immediately applies to the setting of replica symmetry breaking interpolation. Also, abstracting from the SK model improves the conditions in the Ghirlanda-Guerra identities and as a consequence results in a perturbation of smaller order necessary to ensure positivity of the overlap.

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Bibliography

1. Aizenman, M., Sims, R., Starr, S. (2003) An extended variational principle for the SK spin-glass model. *Phys. Rev. B*, 68, 214403.
2. Contucci, Pierluigi; Giardinà, Cristian. The Ghirlanda-Guerra identities. *J. Stat. Phys.* 126 (2007), no. 4-5, 917--931. [MR2311890](#)
3. Ghirlanda, Stefano; Guerra, Francesco. General properties of overlap probability distributions in disordered spin systems. Towards Parisi ultrametricity. *J. Phys. A* 31 (1998), no. 46, 9149--9155. [MR1662161](#) (99h:82045)
4. Guerra, Francesco. Broken replica symmetry bounds in the mean field spin glass model. *Comm. Math. Phys.* 233 (2003), no. 1, 1--12. [MR1957729](#) (2003k:82048)
5. Ledoux, Michel; Talagrand, Michel. Probability in Banach spaces. Isoperimetry and processes. *Ergebnisse der Mathematik und ihrer Grenzgebiete (3) [Results in Mathematics and Related Areas (3)]*, 23. Springer-Verlag, Berlin, 1991. xii+480 pp. ISBN: 3-540-52013-9 [MR1102015](#) (93c:60001)
6. Panchenko, Dmitry. Free energy in the generalized Sherrington-Kirkpatrick mean field model. *Rev. Math. Phys.* 17 (2005), no. 7, 793--857. [MR2159369](#) (2006k:82092)
7. Parisi, Giorgio; Talagrand, Michel. On the distribution of the overlaps at given disorder. *C. R. Math. Acad. Sci. Paris* 339 (2004), no. 4, 303--306. [MR2092018](#) (2005e:82053)
8. Sherrington, D., Kirkpatrick, S. (1972) Solvable model of a spin glass. *Phys. Rev. Lett.* 35, 1792-1796.
9. Talagrand, Michel. Spin glasses: a challenge for mathematicians. Cavity and mean field models. *Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge. A Series of Modern Surveys in Mathematics [Results in Mathematics and Related Areas. 3rd Series. A Series of Modern Surveys in Mathematics]*, 46. Springer-Verlag, Berlin, 2003. x+586 pp. ISBN: 3-540-00356-8 [MR1993891](#) (2005m:82074)
10. Talagrand, Michel. On Guerra's broken replica-symmetry bound. *C. R. Math. Acad. Sci. Paris* 337 (2003), no. 7, 477--480. [MR2023757](#) (2005b:82046)
11. Talagrand, M. (2006) Parisi formula. *Ann. of Math. (2)* 163, no. 1, 221-263.
12. Talagrand, M. (2007) Large deviations, Guerra's and A.S.S. Schemes, and the Parisi hypothesis. *Lecture Notes in Mathematics*, Vol. 1900, Eds: E. Bolthausen, A. Bovier.

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