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**Critical fluctuations of sums of weakly dependent random vectors.** (English) Zbl 0792.60026  
Probab. Theory Relat. Fields 98, No. 2, 229-243 (1994).

Let  $S_n$  be sums of i.i.d. random vectors taking values in a Banach space and  $F$  be a smooth function. We study the fluctuations of  $S_n$  under the transformed measure  $P_n$  given by  $dP_n/dP = \exp(nF(S_n/n))/Z_n$ . If degeneracy occurs, then the projection of  $S_n$  onto the degenerate subspace, properly centered and scaled, converges to a non-Gaussian probability measure with the degenerate subspace as its support. The projection of  $S_n$  onto the non-degenerate subspace, scaled with the usual order  $\sqrt{n}$ , converges to a Gaussian probability measure with the non-degenerate subspace as its support. The two projective limits are in general dependent. We apply this theory to the critical mean field Heisenberg model and prove a central limit type theorem for the empirical measure of this model.

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**MSC:**

**60F10** Large deviations

**60B12** Limit theorems for vector-valued random variables (infinite-dimensional case)

Cited in 1 Document

**Keywords:**

Gaussian probability measure; critical mean field Heisenberg model; central limit type theorem; empirical measure

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**References:**

- [1] Bolthausen, E.: Laplace approximations for sums of independent, random vectors, Probab. Theory Relat. Fields 72, 305-318 (1986); Part II. Degenerate maxima and manifolds of maxima. Probab. Theory Relat. Fields, 76, 167-206 (1987) · [Zbl 0572.60007](#) · [doi:10.1007/BF00699109](#)
- [2] Comets, F., Eisele, Th.: Asymptotic dynamics, non-critical and critical fluctuations for a geometric long-range interacting model. Commun. Math. Phys. 118, 531-567 (1988) · [Zbl 0647.60106](#) · [doi:10.1007/BF01221108](#)
- [3] Ellis, R.S., Newman, C.M.: Limit theorems for sums of dependent random variables occurring in statistical mechanics. Z. Wahrscheinlichkeitstheor. Verw. Geb. 44, 117-139 (1978) · [Zbl 0364.60120](#) · [doi:10.1007/BF00533049](#)
- [4] Ellis, R.S., Wang, K.: Limit theorems for the empirical vector of the Curie-Weiss-Potts model, Stochastic Process. Appl. 35, 59-79 (1990) · [Zbl 0705.60027](#) · [doi:10.1016/0304-4149\(90\)90122-9](#)
- [5] Hoffmann-Jørgensen, J., Pisier, G.: The law of large numbers and the central limit theorem in Banach spaces. Ann. Probab. 4, 587-599 (1976) · [Zbl 0368.60022](#) · [doi:10.1214/aop/1176996029](#)
- [6] Lindenstrauss, J., Tzafriri, L.: Classical Banach Spaces. I. Sequence Spaces, Berlin Heidelberg New York: Springer 1977; II. Function Spaces. Berlin Heidelberg New York: Springer 1979 · [Zbl 0362.46013](#)
- [7] Messer, J., Spohn, H.: Statistical mechanics of the isothermal Lane-Emden equation. J. Stat. Phys. 29, 561-578 (1982) · [doi:10.1007/BF01342187](#)
- [8] Papangelou, F.: On the Gaussian fluctuations of the critical Curie-Weiss model in statistical mechanics. Probab. Theory Relat. Fields 83, 265-278 (1989) · [Zbl 0684.60080](#) · [doi:10.1007/BF00333150](#)
- [9] Papangelou, F.: Large deviations and the internal fluctuations of critical mean field systems. Stochastic Process. Appl. 36, 1-14 (1990) · [Zbl 0703.60023](#) · [doi:10.1016/0304-4149\(90\)90038-T](#)

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