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*Information theoretic inequalities for stable densities*

**Abstract**

We consider the central limit theorem for stable laws in the case of the standardized sum of independent and identically distributed random variables with regular probability density function. By showing decay of different entropy functionals along the sequence we prove convergence with explicit rate in various norms to a L ́evy centered density of parameter λ > 1 . This introduces a new information-theoretic approach to the central limit theorem for stable laws, in which the main argument is shown to be the relative fractional Fisher information, recently introduced in [1]. In particular, it is proven that, with respect to the relative fractional Fisher information, the L ́evy density satisfies an analogous of the logarithmic Sobolev inequality, which allows to pass from the monotonicity and decay to zero of the relative fractional Fisher information in the standardized sum to the decay to zero in relative entropy with an explicit decay rate [2].

[1] G.Toscani, The fractional Fisher information and the central limit theorem for stable laws, Ricerche Mat. 65 (1) 71–91 (2016)   
[2] G. Toscani, Entropy inequalities for stable densities and strengthened central limit theorems, J. Statist. Phys., 165 371-389 (2016)