Entropy Expansions in Probability

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We investigate the convergence of sums of random variables to Gaussian and stable laws in Entropy resp. Fischer-Information distances. In particular we show asymptotic expansions of such distances in terms of semi-invariants (under minimal assumptions) in the context of classical and free probability. The results are based on techniques of harmonic and complex analysis for the approximation of classical and free convolutions of densities. The common structure of asymptotic expansions for these and other limit theorems may be explained by a scheme of approximations for sequences of classes of symmetric functions on spaces of increasing dimension. This is joint work with S. Bobkov, C. Chistyakov and A. Reshetenko.