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Spectral gap, symmetries and log-concave perturbations

The analytic properties of strictly log-concave probability measures are well understood, thanks to the works of Bakry and his collaborators. The case of log-concave measures -but not strictly so- is more delicate. It encompasses the case of uniform measures on compact convex sets. The Kannan-Lovász-Somonić conjecture (KLS) predicts an approximate value of the spectral gap of these measures. In a joint work with Bo'az Klartag, which was initiated by a specific question on a measure related to the LASSO estimator, we study Poincaré inequalities for log concave perturbations of product measures. We use techniques that were devised in order to tackle the KLS conjecture, in particular in the presence of symmetries. Other key ingredients are gaussian mixtures and a recent extension of the Gaussian correlation inequality. As an application, we can confirm, up to logarithmic corrections, the KLS conjecture for sections of unit balls of ℓ_p^n ($p \in [1, 2]$) by vector subspaces of at least proportional dimension.