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Generalized empirical covariance matrices and large deviations.

In many applications of random matrix theory, such as Principal Component Analysis or the study of random landscapes, the behavior of the largest eigenvalue is of particular importance. In this talk, we will consider a model of generalized empirical covariance matrix and we will state a large deviation principle for its largest eigenvalue. The main tool of the proof is the use of a spherical integral of rank one as a proxy for this largest, eigenvalue. This makes possible to tackle not only Gaussian entries but also so-called "sharp sub-Gaussian" entries such as Rademacher random variables. We then have a universality phenomenon - which is rather surprising in the large deviation regime - as well as an elegant representation for the rate function. This talk is based on a collaboration with Ben McKenna.