

## **Deformed matricial models and free probability theory 3/3**

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Practical problems naturally lead to wonder about the spectrum reaction of a given random matrix after a deterministic perturbation. For example, in the signal theory, the deterministic perturbation is seen as the signal, the perturbed matrix is perceived as a "noise" and the question is to know whether the observation of the spectral properties of "signal plus noise" can give access to significant parameters on the signal. A typical illustration is the so-called BBP phenomenon (after Baik, Ben Arous, Pécché) which put forward outliers (eigenvalues that move away from the rest of the spectrum) and their Gaussian fluctuations for spiked covariance matrices. The aim of this lecture is to show how free probability theory sheds light on spectral properties of deformed matricial models and provides a unified understanding of various phenomena.

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