



**UNIVERSITÄT  
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# Seminar

Bielefeld - Melbourne Random Matrices

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### Applying Random Matrix Theory to Portfolio Selection

The estimation of covariance matrices plays a fundamental role in portfolio selection in financial engineering. Recently, a new type of estimators of large-dimensional covariance matrices has been introduced. They are called nonlinear shrinkage estimators in financial engineering [1] and rotationally invariant estimators in physics [2]. The construction of the estimators is based on the idea of James-Stein shrinkage and exact relations between eigenvalues of sample covariance matrix and population covariance matrix. I will briefly recall the main ideas behind the construction and sketch how to generalise it to the case of correlated samples.

[1] Olivier Ledoit, and Michael Wolf—Nonlinear shrinkage of the covariance matrix for portfolio selection: Markowitz meets Goldilocks, *Review of Financial Studies*, 30 (2017) 4349-4388.

[https://www.econ.uzh.ch/dam/jcr:ee86799b-f478-4495-b6c5-9e3ee0b07a51/rfs\\_2017.pdf](https://www.econ.uzh.ch/dam/jcr:ee86799b-f478-4495-b6c5-9e3ee0b07a51/rfs_2017.pdf)

[2] Joel Bun, Jean-Philippe Bouchaud, Marc Potters—Cleaning large correlation matrices: tools from random matrix theory, *Physics Reports*, 666 (2017) 1-112.

<https://www.sciencedirect.com/journal/physics-reports/vol/666/suppl/C>

**Wednesday, 11 November, 0900 hrs CET**

Zoom Konferenzschaltung— Please contact Anas Rahmann  
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