



**UNIVERSITÄT  
BIELEFELD**



Faculty of Physics



Faculty of Mathematics



THE UNIVERSITY OF  
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# Seminar

Bielefeld - Melbourne Random Matrices

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## Local Marchenko-Pastur Law on the Optimal Scale

Consider an  $N$  by  $N$  matrix  $X$  of complex entries with iid real and imaginary parts. We show that the local density of eigenvalues of  $X^*X$  converges to the Marchenko-Pastur law on the optimal scale with probability 1. We also obtain rigidity of the eigenvalues in the bulk and near both hard and soft edges. Here we avoid logarithmic and polynomial corrections by working directly with high powers of expectation of the Stieltjes transforms. We work under two sets of assumptions: either the entries have bounded moments or the entries have a finite 4th moment and are truncated at  $N^{1/4}$ . In this work we simplify and adapt the methods from prior papers of Götze-Tikhomirov and Cacciapuoti-Maltsev-Schlein to covariance matrices. This is joint work with Anastasis Kafetzopoulos.

**Wednesday, 13 October 2021, 0900 hrs CEST**

Zoom Conference Call— Please contact Anas Rahman  
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