

OPSFOTA network meeting

2-3 November 2023

King's College London
Strand Campus, Strand Building
room S-3.20 (level minus three)

Webpage: [OPSFOTA meeting, 2-3 November, KCL](#)

Speakers and Schedule

2 November 2023

- 14:00-15:00: Anna Maltsev (QMUL)
Title: Bulk Universality for Complex Non-Hermitian Matrices
- coffee break*
- 15:30-16:30: Erik Koelink (Radboud)
Title: Darboux factorisation for matrix orthogonal polynomials
- coffee break*
- 17:00-18:00: Nick Simm (Sussex)
Title: Character expansion in non-Hermitian ensembles
- drinks+dinner*

3 November 2023

- 10:00-11:00: Frantisek Stampach (TU Prague)
Title: Inverse spectral problem for complex bounded Jacobi matrices
- coffee break*
- 11:30-12:30: Ken McLaughlin (Tulane, New Orleans)
Title: Rare events in random matrix theory and asymptotic analysis of orthogonal polynomials

Titles and Abstracts

Anna Maltsev

Bulk Universality for Complex Non-Hermitian Matrices

Abstract. In this talk I will discuss universality the k -point of correlation function for Gauss divisible non-Hermitian matrices. We consider $N \times N$ matrices with centred, independent and identically distributed complex entries that have a small Gaussian component. We prove that the bulk correlation functions are universal in the large N limit using Householder transformations, supersymmetry, and Laplace method. Assuming the entries have finite moments and are supported on at least three points, the Gaussian component is removed by the four moment theorem. This is based on joint work with Mohammed Osman.

Nick Simm

Character expansion in non-Hermitian ensembles

Abstract. The archetypal model of a non-Hermitian random matrix is the Ginibre ensemble, consisting of i.i.d. standard Gaussian entries with no symmetry constraints. Such ensembles come in three flavours, depending on whether the entries are real, complex or quaternionic. I will discuss the character expansion technique for evaluating correlations of characteristic polynomials in such models. By employing the theory of symmetric functions, particularly Schur and zonal polynomials, we give a unified treatment in all three settings. This is joint work with A. Serebryakov (Sussex).

Erik Koelink

Darboux factorisation for matrix orthogonal polynomials

Abstract. We consider matrix orthogonal polynomials which are eigenfunctions to a matrix differential operator. Applying a Darboux factorisation to the matrix differential operator we can obtain a set of orthogonal matrix polynomials, which are matrix analogues of exceptional orthogonal polynomials. We discuss a general construction and a particular example. This is based on joint work with Pablo Román and Lucía Morey.

Frantisek Stampach

Inverse spectral problem for complex bounded Jacobi matrices

Abstract. A well known result from the theory of Jacobi operators tells us that there is a one-to-one correspondence between the set of all bounded self-adjoint Jacobi matrices J and the set of their spectral measures, i.e., compactly supported non-degenerate probability measures μ on \mathbb{R} . We present a variant of this correspondence applicable to a class of bounded **non-self-adjoint** Jacobi matrices J . The spectral measure μ is replaced by a pair (ν, ψ) , where ν is the spectral measure of $|J| := \sqrt{J^*J}$ and ψ is a *phase function* satisfying $|\psi| \leq 1$ ν -a.e. If $J \geq 0$, ν coincides with the spectral measure μ of J and $\psi \equiv 1$. The talk is based on a joint work with A. Pushnitski.

Ken Mclaughlin

Rare events in random matrix theory and asymptotic analysis of orthogonal polynomials

Abstract. We will compute some basic quantities from random matrix theory (as always in the limit when the matrix size tends to ∞), conditioned on the existence of a large gap in the eigenvalue spectrum. Some basic yet interesting questions in the asymptotic analysis of special functions and orthogonal polynomials will arise; open questions will hopefully emerge.

Organisers.

Ana Loureiro (Kent), Alexander Pushnitski (KCL), Eugene Shargorodsky (KCL)

Sponsors.

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