

Schedule Summer School Randomness in Physics & Mathematics

(week 1 = 5.-10.8. & week 2 = 12.-17.8.)

week 1	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9:15	welcome					
9:30-10:30	S. Majumdar	I. Corwin	A. Guionnet	S. Majumdar	I. Corwin	A. Guionnet
coffee						
11-12	Y. Fyodorov	S. Majumdar	I. Corwin	I. Corwin	S. Majumdar	Y. Fyodorov
lunch						
14-15	A. Guionnet	Y. Fyodorov	posters*	A. Guionnet	Y. Fyodorov	excursion
15-16:30	exercises	exercises	3 talks*	exercises	exercises	-”-
coffee						
17-18	solutions	solutions	4 talks*	solutions	solutions	-”-
19-	reception & music					

week 2	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9:30-10:30	C. Tracy	S. Müller	R. Müller	C. Tracy	S. Müller	R. Müller
coffee						
11-12	R. Speicher	C. Tracy	S. Müller	R. Speicher	C. Tracy	S. Müller
lunch						
14-15	R. Müller	R. Speicher	3 talks*	R. Müller	R. Speicher	departure
15-16:30	exercises	exercises	coffee &	exercises	exercises	
coffee			4 talks*			
17-18	solutions	solutions		solutions	solutions	
19-	reception					

* see separate Wednesday afternoon programs

Lecture Titles:

- S. Majumdar: *Top eigenvalue of a random matrix : 3-rd order phase transition and applications*
- Y. Fyodorov: *High-Dimensional Random Fields and Random Matrix Theory*
- A. Guionnet: *Heavy tails random matrices*
- I. Corwin: *Integrable particle systems and Macdonald processes*
- C. Tracy: *Integrable Models in Statistical Physics*
- R. Speicher: *Free Probability and Random Matrices*
- R. Müller: *Random Matrices in Communications Engineering*
- S. Müller: *Universality in Quantum Chaos*

Wednesday Afternoon Program

Wednesday 7.8.		Wednesday 14.8.	
14:00 – 15:00	Poster Session	14:00 – 15:00	Taro Nagao
15:00 – 15:20	Yuchen Pei	15:00 – 15:20	Leonid Chaichenets
15:20 – 15:40	Arjun Krishnan	15:20 – 15:40	Anthony Mays
15:40 – 16:00	Nick Simm	coffee	
coffee		16:10 – 16:30	Antonio Lerario
16:30 – 16:50	Alexey Naumov	16:30 – 16:50	Jeffrey Kuan
16:50 – 17:10	Tim Wirtz	16:50 – 17:10	Artur Swiech
17:10 – 17:30	Jesper Ipsen	17:10 – 17:30	Fabio Deelan Cunden
17:30 – 17:50	David Renfrew		

Poster Titles:

- Rouhollah Ebrahimi: “Basic Matrix Models for Quantum Gravity”
- Jacek Grela: “Diffusion in the space of complex hermitian matrices: Microscopic properties of the averaged characteristic polynomials and averaged inverse characteristic polynomials”
- Lingyun Li: “Central Limit Theorem for Linear Statistics of Eigenvalues of Band Random Matrices”
- André Nock: “Universal K-matrix distribution in $\beta = 2$ Ensembles of Random Matrices”
- Anna Reshetenko: “Asymptotic Approximations in Free Probability”

Talk Titles:

- Yuchen Pei: “A q-weighted Robinson-Schensted algorithm”
- Arjun Krishnan: “Variational formula for the Limit Shape of First-Passage Percolation”
- Nick Simm: “GUE characteristic polynomials and fractional Brownian motion with Hurst index $H=0$ ”
- Alexey Naumov: “On the smallest singular value of large random matrices with correlated entries”
- Tim Wirtz: “Distribution of the Smallest Eigenvalue in the Correlated Wishart Model”
- Jesper Ipsen: “Products of Rectangular Ginibre Matrices”
- David Renfrew: “Finite rank perturbations to non-hermitian random matrices”
- Taro Nagao: “The spectral density of scale-free networks”

- Leonid Chaichenets: “Communication in wireless ad hoc networks - a stochastic geometry model”
- Anthony Mays: “Power control on a random wireless network with asymmetric interference”
- Antonio Lerario: “Statistics on Hilbert’s Sixteenth Problem”
- Jeffrey Kuan: “Three-dimensional Gaussian fluctuations of noncommutative random surface growth”
- Artur Swiech: “Applications of generalized free addition and multiplication laws”
- Fabio Deelan Cunden: “Ensembles of random quantum states”

Literature for the Lectures:

- Y. Fyodorov:

Y. Fyodorov, “High-Dimensional Random Fields and Random Matrix Theory”, arXiv:1307.2379 [math-ph]
- A. Guionnet:

ANDERSON, G.; GUIONNET, A. and ZEITOUNI O.; An introduction to random matrices, Cambridge Studies in Advanced Mathematics, **118**, Cambridge University Press (2010), See O. Zeitouni webpage <http://www.math.umn.edu/~zeitouni/technion/index.html>

BEN AROUS, G. and GUIONNET, A.; The spectrum of heavy tailed random matrices *Comm. Math. Phys.*,**278**,715–751(2008)

BENAYCH-GEORGES, F.; GUIONNET, A. and MALE, C.; Central limit theorems for linear statistics of heavy tailed random matrices, *arxiv 1301.0448*

BORDENAVE, C. et GUIONNET A.; Localization and delocalization of eigenvectors for heavy-tailed random matrices, arXiv 1201.1862, to appear in Prob. Rel. Fields
- I. Corwin:
 1. Ivan Corwin, “The Kardar-Parisi-Zhang equation and universality class”, arXiv:1106.1596 [math.PR]
 2. Alexei Borodin, Vadim Gorin, “Lectures on integrable probability”, arXiv:1212.3351 [math.PR]
- C. Tracy: My four lectures will give an overview of (I) the 2D Ising model, (II) Painlevé functions in random matrix theory, and (III) Bethe Ansatz methods in ASEP and other integrable models.
 1. John Palmer, ”Planar Ising Correlations”
 2. Barry McCoy, ”Advanced Statistical Mechanics”
 3. Bill Sutherland, ”Beautiful Models: 70 Years of Exactly Solved Quantum Many-Body Problems”

4. Craig A. Tracy, Harold Widom, "Formulas and Asymptotics for the Asymmetric Simple Exclusion Process" *Math Phys Anal Geom* (2011) 14:211235 (.pdf at arXiv:1101.2682)

5. Craig A. Tracy, Harold Widom, "Airy kernel and Painleve II" arXiv:solv-int/9901004

- R. Speicher:

A. Nica, R. Speicher, "Lectures on the combinatorics of free probability theory"

- S. Müller:

1. F. Haake, *Quantum Signatures of Chaos*, 3rd ed., Springer, Berlin (2010) [in particular chapters 9 and 10]

2. H.-J. Stöckmann, *Quantum Chaos: An Introduction*, Springer (2007) [in particular chapters 7 and 8.2]

3. S. Müller and M. Sieber, *Quantum Chaos and Quantum Graphs*, *The Oxford Handbook of Random Matrix Theory*, eds. G. Akemann, J. Baik, and P. Di Francesco (2011) [<http://www.maths.bris.ac.uk/~maxsm/Chapter33.pdf>]

4. S. Müller, *Quantum Chaos*, Undergraduate lecture notes, University of Bristol (2013) [<http://www.maths.bris.ac.uk/~maxsm/qcnotes.pdf>]