Univ. Leipzig

Mathematisches Institut

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(Fach-)Seminar im Sommersemester 2013

Determinantal Processes

A Determinantal Process is a random selection of points of a given set such that its law can be described by a certain determinantal formula for some matrix resp. operator. Such processes arise in various different mathematical areas such as random matrix theory, combinatorics, random analytic functions and representation theory. The seminar will treat the most important examples together with aspects of a general theory.

Topics/Talks

1. Introduction & Non-Intersecting Random Walks (A 4.3.1 – 4.3.3)
2. Existence and Construction of Determinantal Processes (A 4.5 & A 4.5)
3. Eigenvalues of Random Matrix Ensembles (E)
4. Uniform Spanning Trees and Forests (D)
5. Zeros of Hyperbolic Gaussian Analytic Functions (F)
6. Permanental Processes (A 4.9)
7. Eynard-Mehta-Theorem (cf. G Sect. 4)
8. Dimer Models (G Sect. 4 and H)
9. Asymptotics of Plancherel Measures (I)
10. Exterior Algebra and Stochastic Domination (C)

References

A) Hough, J. Ben; Krishnapur, Manjunath; Peres, Yuval; Virág, Bálint *Zeros of Gaussian analytic functions and determinantal point processes*. University Lecture Series, 51. American Mathematical Society, Providence, RI, 2009.
B) Benjamini, Itai, Kesten, Harry; Peres, Yuval; Schramm, Oded, *Geometry of the uniform spanning forest: transitions in dimensions 4,8,12,...*. Ann. of Math. (2) 160 (2004), no. 2, 465–491.
C) Lyons, Russell *Determinantal probability measures*. Publ. Math. Inst. Hautes Études Sci. No. 98 (2003), 167–212.
D) Benjamini, Itai, Lyons, Russell; Peres, Yuval; Schramm, Oded *Uniform spanning forests.* Ann. Probab. 29 (2001), no. 1, 1–65.
E) Tao, Terence *Topics in random matrix theory*. Graduate Studies in Mathematics, 132. American Mathematical Society, Providence, RI, 2012
F) Peres, Yuval, ; Virág, Bálint *Zeros of the i.i.d. Gaussian power series: a conformally invariant determinantal process*. Acta Math. 194 (2005), no. 1, 1–35.
G) Borodin, Alexei, *Determinantal point processes.* The Oxford handbook of random matrix theory, 231–249, Oxford Univ. Press, Oxford, 2011
H) Kenyon, Richard *Local statistics of lattice dimers.* Ann. Inst. H. Poincaré Probab. Statist. 33 (1997), no. 5, 591–618.
I) Borodin, Alexei; Okounkov, Andrei; Olshanski, Grigori *Asymptotics of Plancherel measures for symmetric groups*. J. Amer. Math. Soc. 13 (2000), no. 3, 481–515.

If you are interested **to participate** write an email to **renesse@uni-leipzig.de.**