

Graduate seminar on Probability Theory: Log gases and random matrices

Thursdays at 14 (c.t.) (duration: 90 minutes)
Room 1.007

List of Talks

No.	Date	Title and references	Speaker
	April 16	No Seminar!	
1	April 23	Introduction including overview and connection to physics	Johannes Alt
2	April 30	Joint distribution of eigenvalues of Gaussian random matrices Definition of Gaussian unitary and Gaussian orthogonal ensemble (GUE, GOE), see [Kem22, Section 13.1]. Statement of [Kem22, Theorem 14.3] and its proof, see [Kem22, Section 14], including inputs, i.e. parts of [Kem22, Section 13.1]. Statement of [Kem22, Theorem 14.4]. Alternative reference: [AGZ10, Sections 2.5.1 and 2.5.2].	H-Y C.
3	May 7	β-ensembles and tridiagonal random matrices Definition of β -ensemble [AGZ10, beginning of Section 2.6], Motivation for condition [AGZ10, eq. (2.6.2)] Statement of [AGZ10, Theorem 4.5.35] and its proof, see [AGZ10, Section 4.5.1]. See Errata Sheet of [AGZ10].	W. C.
	May 14	No Seminar: Ascension Day	
4	May 21	Limit of empirical measure of β-ensemble Statement of [AGZ10, Lemma 2.6.2] and its proof, see [AGZ10, Section 2.6.1]. Required definitions, in particular, the one of a good rate function, see [AGZ10, pages 71 and 72]. See Errata Sheet of [AGZ10].	A. R.
	May 28	No Seminar: Pentecost Break	
	June 4	No Seminar: Corpus Christi	
	June 11	No Seminar!	
5	June 18	Large deviations for β-ensemble and large deviation theory Statements of [AGZ10, Theorem 2.6.1] and [AGZ10, Corollary 2.6.3], formulate the second one in more detail. Basic notions on large deviations [AGZ10, Appendix D] until end of [AGZ10, Theorem D.8]. See Errata Sheet of [AGZ10].	Y. Q.
6	June 25	Large deviation for empirical measure Proof of [AGZ10, Theorem 2.6.1]. See Errata Sheet of [AGZ10].	M. M.
7	July 2	Large deviation for maximum Statement of [AGZ10, Theorem 2.6.6] and its proof including inputs, see [AGZ10, Section 2.6.2]. See Errata Sheet of [AGZ10].	T. M.

No.	Date	Title and references	Speaker
8	July 9	Sine process and k-point correlation functions of GUE	
9	July 16		
10	July 23		

References and how to access them

The references [AGZ10] and [Kem22] are freely and legally available via the given links. Please check the errata sheet for [AGZ10]. Alternative monographs are [For10] and [PS11]. The book [For10] can be accessed digitally via the webpage of the Bonn University library at <https://www.ulb.uni-bonn.de/en>.

The monographs [AGZ10], and [For10] can be found in the library. (The book [PS11] is available in the Physics library.)

If you experience difficulties to access a reference then please contact Johannes Alt via email.

References

- [AGZ10] G.W. Anderson, A. Guionnet, and O. Zeitouni, *An introduction to random matrices*, Cambridge Studies in Advanced Mathematics, vol. 118, Cambridge University Press, Cambridge, 2010, Available at <https://www.wisdom.weizmann.ac.il/~zeitouni/cupbook.pdf>; see also Errata Sheet at <https://www.wisdom.weizmann.ac.il/~zeitouni/cormat.pdf>.
- [For10] P. J. Forrester, *Log-gases and random matrices*, London Mathematical Society Monographs Series, vol. 34, Princeton University Press, Princeton, NJ, 2010. MR 2641363
- [Kem22] T. Kemp, *Introduction to random matrix theory*, 2022, Lecture notes, available at <https://mathweb.ucsd.edu/~tkemp/RMT.Notes.pdf>.
- [PS11] L. Pastur and M. Shcherbina, *Eigenvalue distribution of large random matrices*, Mathematical Surveys and Monographs, vol. 171, American Mathematical Society, Providence, RI, 2011. MR 2808038