

# BENEDEK VALKÓ

August 15, 2023

## Research Interests

Probability theory, random matrices, large stochastic systems.

## Positions Held

- 2016 – present Full Professor, University of Wisconsin-Madison
- 2013 – 2016 Associate Professor, University of Wisconsin-Madison
- 2008 – 2013 Assistant Professor, University of Wisconsin-Madison
- 2005 – 2008 Postdoctoral Fellow, University of Toronto at Scarborough
- 2004 Research Assistant, Technical University Budapest
- 2003 – 2005 Junior Researcher, Rényi Institute of Mathematics,  
Hungarian Academy of Sciences

## Education

- 2004 Ph.D. in Mathematics Technical University Budapest, Hungary
- 2000 M. Sc. in Mathematics Eötvös Loránd University of Budapest, Hungary

## Awards

- 2023 – 2026 NSF Research Grant DMS-2246435 (\$210 000)  
Random matrices, operators, and analytic functions.
- 2022 – 2023 UW-Madison Fall Research Competition grant (\$32 982)
- 2019 – 2023 Van Vleck Prize
- 2017 – 2020 NSF Research Grant DMS-1712551 (\$270 000)  
Random Matrices and Interacting Systems.
- 2017 – 2018 Simons Fellowship in Mathematics  
Random Matrices and Interacting Systems.
- 2011 – 2017 NSF CAREER award DMS-1053280 (\$499 999)  
Random eigenvalue problems and fluctuations of large stochastic systems.
- 2009 – 2012 NSF Research Grant DMS-0905820 (\$150 000)  
Random matrices and interacting particle systems
- 2004 Géza Grünwald Prize awarded by the János Bolyai  
Mathematical Society of Hungary
- 2001 Pro Scientia Prize awarded by the Council of National Scientific  
Students' Associations, Hungary
- 2000 Kátó Rényi Prize awarded by the János Bolyai  
Mathematical Society of Hungary

## Conferences Organized

- 2023 *Random Growth Models and KPZ Universality*,  
Banff International Research Station (co-organizer)
- 2019 *Special Session on Large Scale Properties of Interacting Stochastic Systems*,  
AMS Sectional meeting, Madison, WI (co-organizer)
- 2016 *Beta Ensembles: Universality, Integrability, and Asymptotics*  
Banff, Canada (co-organizer)
- 2015 *Stochastics and Interactions*  
Budapest, Hungary (co-organizer)
- 2005 *Large Scale Behaviour of Interacting Particle Systems*  
Budapest, Hungary (co-organizer)

## Publications

- 35. B. Valkó, B. Virág: Palm measures for Dirac operators and the Sine beta process, *Stochastic Processes and their Applications*, Vol 163, (2023), 106–135
- 34. Y. Li, B. Valkó: Operator level limit of the circular Jacobi  $\beta$ -ensemble (2022), *Random Matrices: Theory and Applications* Vol. 11, No. 04, 2250043 (2022)
- 33. G. Bonner, J-L. Thiffeault, B. Valkó: On a random entanglement problem (2020), *IMA Journal of Applied Mathematics*, Volume 87, Issue 6, December 2022, Pages 1090–1120
- 32. B. Valkó, B. Virág: The many faces of the stochastic zeta function (2022), *Geometric and Functional Analysis*, 32, 1160–1231 (2022)
- 31. L. Dumaz, Y. Li, B. Valkó: Operator level hard-to-soft transition for beta-ensembles, *Electron. J. Probab.* 26: 1-28 (2021)
- 30. B. Valkó, B. Virág: Operator limit of the circular beta ensemble, *Ann. Probab.*, Vol 48, Number 3 (2020), 1286-1316
- 29. S. Ledger, B. Tóth, B. Valkó: Random walk on the randomly-oriented Manhattan lattice, *Electronic Communications in Probability*, 23, (2018)
- 28. B. Valkó, B. Virág: The  $\text{Sin}_\beta$  operator, *Inventiones mathematicae*, 209 (1), 275-327 (2017)
- 27. D. Holcomb, B. Valkó: Overcrowding asymptotics for the  $\text{Sin}_\beta$  process, *Annales de l'Institut Henri Poincaré - Probabilités et Statistiques* 53 (3), 1181-1195 (2017)
- 26. B. Rider, B. Valkó: Matrix Dufresne identities. *International Mathematics Research Notices*. Vol. 2016, No. 1, 174–218 (2016)
- 25. D. Holcomb, B. Valkó: Large deviations for the  $\text{Sin}_\beta$  and  $\text{Sch}_\tau$  processes. *Prob. Theory and Rel. Fields*, Vol. 163, Issue 1, 339–378, (2015).
- 24. G. Moreno Flores, T. Seppäläinen, B. Valkó: Fluctuation exponents for directed polymers in the intermediate scaling regime. *Electronic Journal of Probability*, Vol. 19 (2014) paper 89, 1-28.

23. B. Valkó, B. Virág: Random Schrödinger operators on long boxes, noise explosion and the GOE, *Transactions of AMS*, Volume 36, 3709–3728, 6 (2014)
22. J. Quastel, B. Valkó: Diffusivity of lattice gases. *Archive for Rational Mechanics and Analysis*, Volume 210, Issue 1, pp 269-320 (2013)
21. E. Kritchevski, B. Valkó, B. Virág: The scaling limit of the critical one-dimensional random Schrödinger operator, *Comm. Math. Phys.*, **314**, Issue 3, 775-806. (2012)
20. B. Tóth, B. Valkó: Superdiffusive bounds on self-repellent Brownian polymers and diffusion in the curl of the Gaussian free field in  $d = 2$ , *Journal of Stat. Phys.*, **147**, Issue 1, 113–131 (2012)
19. P. Tarrès, B. Tóth, B. Valkó: Diffusivity bounds for 1d Brownian polymers, *Annals of Probab.*, **40**, no. 2, 695-713. (2012)
18. T. Oh, J. Quastel and B. Valkó: Interpolation of Gibbs measures with White Noise for Hamiltonian PDE, *Jour. Math. Pure Appl.*, **97**, Issue 4, 391–410 (2012)
17. S. Jacquot, B. Valkó: Bulk scaling limit of the beta Laguerre ensemble, *Electronic Journal of Probability*, Vol. 16 (2011) paper 11, 314-346.
16. G. Amir, O. Angel, B. Valkó: The TASEP speed process, *Annals of Probab.*, **39**, no. 4, 1205-1242, (2011).
15. B. Valkó, B. Virág: Large gaps between random eigenvalues, *Annals of Probab.*, **38**, no. 3, 1263–1279 (2010)
14. T. Seppäläinen, B. Valkó: Bounds for scaling exponents for a 1+1 dimensional directed polymer in a Brownian environment, *Alea* 7, 451-476 (2010)
13. B. Valkó, B. Virág: Continuum limits of random matrices and the Brownian carousel, *Inventiones Mathematicae* **177**, no. 3, (2009)
12. J. Quastel, B. Valkó: KdV Preserves White Noise, *Commun. Math. Phys.* **277** (2008), no. 2, 707-714.
11. J. Quastel, B. Valkó: A note on the diffusivity of finite-range asymmetric exclusion processes on  $\mathbf{Z}$ , In: V. Sidoravicius, M.E. Vares (eds): *In and Out of Equilibrium 2, Progress in Probability* **60**, Birkhäuser (2008), 543–550
10. A. Rudas, B. Tóth, B. Valkó: Random Trees and General Branching Processes, *Random Structures and Algorithms* **31** (2007), no. 2, 186–202
9. J. Quastel, B. Valkó:  $t^{1/3}$  Superdiffusivity of Finite-Range Asymmetric Exclusion Processes on  $\mathbf{Z}$ , *Commun. Math. Phys.* **273** (2007), no. 2, 379–394.
8. B. Valkó: Hydrodynamic limit for perturbation of a hyperbolic equilibrium point in two-component systems, *Ann. Inst. H. Poincaré Probab. Statist.* **42** (2006), no. 1, 61–80.
7. B. Tóth, B. Valkó: Perturbation of singular equilibria of hyperbolic two-component systems: a universal hydrodynamic limit, *Commun. Math. Phys.* **256**, 111-157 (2005)

6. B. Tóth, B. Valkó: Onsager Relations and Eulerian Hydrodynamic Limit for Systems with Several Conservation Laws, *Journal of Stat. Phys.*, **112** (2003), 497-521
5. B. Tóth, B. Valkó: Between equilibrium fluctuations and Eulerian scaling: Perturbation of equilibrium for a class of deposition models, *Journal of Stat. Phys.*, **109** (2002), 177-205
4. B. Valkó: Discrepancy of arithmetic progressions in higher dimensions, *Journal of Number Theory*, **92** (2002), 117–130.
3. S. Csörgő, B. Valkó, W.B. Wu: Random multisets and bootstrap means. *Acta Sci. Math. (Szeged)*, **67** (2001), 843–875.
2. B. Valkó: On irregularities of sums of integers, *Acta Arithmetica*, **92** (2000), 367–381.
1. G. Dombi, B. Valkó: On a problem of Erdős, *Acta Mathematica Hungarica*, **77** (1997), 47–56.

### Textbooks

D. Anderson, T. Seppäläinen, B. Valkó: Introduction to Probability (Cambridge Mathematical Textbooks), Cambridge University Press, 2017

### Mentoring

#### *Graduate students*

Yahui Qu	Ph. D. 2027+	
Jiaming Xu	Ph. D. 2024	(expected)
Yun Li	Ph. D. 2022	Postdoc at Yau Mathematical Sciences Center, Tsinghua University, Beijing
Hans Chaumont	Ph. D. 2018	Adaptive Biotechnologies, Seattle
Christopher Janjigian	Ph. D. 2016	Assistant Professor at Purdue University
Diane Holcomb	Ph. D. 2014	Postdoc at KTH, Sweden

#### *Postdoctoral fellows*

Gregorio Moreno Flores 2010 – 2013 Catholic University of Chile  
(co-advised with T. Seppäläinen)

### Significant service to the department and the university

- Associate Chair (2018 – 2022)
- Director of Undergraduate Studies in the Department of Mathematics (2014 – 2017, 2018, 2022-)
- Faculty advisor to about 80–100 students in the mathematics major and certificate programs (2014 – 2017, 2018 – )
- Quantitative Reasoning Liaison (2014 – 2017, 2018 – )
- Member of the University General Education Committee (2014 – 2017, 2018 – )

- Member of the Math Steering Committee of the UW System Math Initiative for UW-Madison (2018 – 2020)

### Significant service to the profession

- Associate Editor for the *Annals of Applied Probability* (2013 – 2018)
- Seminar organizer: Toronto Probability Seminar (co-organizer, 2006 – 2008), UW-Madison Probability Seminar (organizer, 2009 – 2012, co-organizer 2012 – present), UW-Madison Graduate Probability Seminar (organizer, 2012-present)
- Week-long lecture series on beta-ensembles, at Gaukushuin University, Tokyo (2014)
- Referee for various journals including *Electronic Journal of Probability*, *Probability Theory and Related Fields*, *Electronic Communications in Probability*, *Annals of Probability*, *Inventiones*.
- Served on NSF Award panel.

### Outreach

Co-organizer of the Wisconsin Mathematics, Engineering and Science Talent Search (2011 – 2012), director of the program (2012 – present).

### Selected recent invited lectures

- 2023: The 24th Midrasha Mathematicae: Random Schrödinger Operators and Random Matrices, Jerusalem
- 2022: University of Colorado Boulder, Probability Seminar
- 2022: Rényi 100 Conference, Stochastics with Interactions invited session, Budapest
- 2021: Bristol University, Probability Seminar
- 2021: Séminaire Matrices et graphes aléatoires (MEGA), Institut Henri Poincaré, Paris
- 2020: Columbia University, Probability seminar
- 2019: *23rd Brazilian School of Probability*, Sao Carlos, Brazil
- 2018: *Spectral Theory of Quasi-Periodic and Random Operators*, CRM, Montreal
- 2018: MIT, Probability Seminar
- 2018: *Optimal and Random Point Configurations*, ICERM
- 2017: University of Utah, Department Colloquium and Probability Seminar
- 2017: University of Arizona, Department Colloquium
- 2016: *Clifford Lectures*, Tulane University
- 2016: DePaul University, Department Colloquium
- 2016: *British Mathematics Colloquium*, Bristol