Miklós Bóna

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Depatment of Mathematics
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Education

Massachusetts Institute of Technology, 1993-1997. Cambridge, MA
Ph.D. in Mathematics, June 1997.
Thesis Title: Exact and Asymptotic Enumeration of Permutations with subsequence conditions.
Thesis advisor: Prof. Richard P. Stanley.

Paris 7 University, 1991–1992. Paris, France
M.S. with Honor in Mathematics, September 1992.

Ecole Normale Supérieure 1992-1993. Paris, France
Visiting Scholar.

Eötvös Loránd University, 1987–1992. Budapest, Hungary
M.S. with Honor in Mathematics, June 1992.

Positions

University of Florida

March 2010 – present
Professor and Distinguished Teaching Scholar

Aug 2009 – March 2010
Professor.

Aug 2004 – Aug 2009 Gainesville, FL
Associate Professor.

Aug 1999 – Aug 2004.
Assistant Professor.

University of Pennsylvania Sept 2005 – Dec 2005. Philadelphia, PA
Visiting Associate Professor.

Institute for Advanced Study, Sept 98 – June 99. Princeton, NJ.
Member.

University of Quebec at Montreal, Sept 97 – August 98. Montreal, PQ, Canada.
Postdoctoral Fellow.

RESEARCH

Research Interests

Combinatorics, Posets, Probability, Computer Science, Mathematical Biology.
AMS subject classification numbers: 05, 06, 60, 68, 92.

Research Grants

1. Simons Collaboration Grant, September 1, 2022 – August 31, 2027. The amount of the grant is 42000 dollars.
2. American Mathematical Society Grant (partially founded by the NSF) *Mathematical Reseaerch Communities: Trees in Many Contexts*. I was one of five senior personnel on this project. We held a one-week research-intense meeting in Java Center, NY, June 5-11, 2022. Each senior researcher led a small group of 5-7 younger researchers (from graduate students to untenured faculty) in attacking a problem.
3. Simons Collaboration Grant, September 1, 2016 – August 31, 2021. The amount of the grant is 35000 dollars.
4. (with Meera Sitharam, Mavis McKenna, and Andrew Vince) Joint research grant from the National Science Foundation, to study virus decompositions. The original duration of the grant was from August 2011 to June 2014, but it is still in a no-cost extension, till August 1, 2017. The amount of the grant is 420,000 dollars. The grant was awarded on October 1, 2011.
5. (with Meera Sitharam and Mavis McKenna) Joint research grant of The National Science Foundation and the National Institute of the General Medical Sciences. The duration of the grant is from August 2007 to June 2011. The amount of the grant was 548,660 dollars. The grant was awarded on Aug 15, 2007.
6. Seed grant for Mathematical Biology, University of Florida, 2010-2011. The amount of the grant was 50000 dollars.
7. Award to Mentor Undergraduate Research, Howard Hughes Medical Institute, 2007-2009. The amount of the grant was 10000 dollars.
8. Young Investigator Award of The National Security Agency, for calendar years 2007 and 2008. The amount of the grant was 30000 dollars.
9. Young Investigator Award of The National Security Agency, for calendar years 2005 and 2006. The amount of the grant was 30000 dollars.
10. Young Investigator Award of The National Security Agency, for calendar years 2003 and 2004. The amount of the grant was 26000 dollars.
11. College of Liberal Arts and Sciences Research Award, University of Florida, 2000-2001. The amount of the grant was 15000 dollars.

Featured Talks

Invited Speaker at various conferences in Mexico, Canada, South Korea, Italy, and the United States.

Awards (non-teaching)

1. Co-PI on an NSF grant to organize the Bijective and Algebraic Combinatorics conference, March 2014. The amount of the grant was 12000 dollars.
2. Inducted in the Academy of Distinguished Teaching Scholars at the University of Florida, March 2010. No more than five faculty members per year get this honor at the University of Florida. The honor carries a 5000-dollar per year research fund for each of the next three years. The Academy advises the provost on matters related to teaching improvements at UF.

3. Allen and Margaret Crow Term Professorship, College of Liberal Arts and Sciences, University of Florida, 2008-2009. There are six such awards per year for our 39-department college. The award carries a 5000-dollar salary supplement, and 1000 dollars for research expenses.
4. Applied Mathematics Fellowship, Massachusetts Institute of Technology, (Cambridge, MA, Spring 1997).
5. Fellowship from the French Government to complete a Master's Degree in Mathematics, (Paris, France, September 1991-June 1993).

Sabbaticals and Research Leaves

1. Department of Mathematics, UF, August 2019 – 2020.
2. Department of Microbiology and Molecular Genetics, College of Medicine, University of Florida, August 2012 – May 2013.
3. Department of Mathematics, University of Pennsylvania, Sept 2005 – Dec 2005.

Editorial activities

1. Editor-in-Chief, Electronic Journal of Combinatorics, from 2010 to present.
2. Series editor, Discrete Mathematics and Its Applications, CRC Press – Chapman Hall, from 2013 to present.
3. Series editor, Monograph series, CRC Press – Chapman Hall, from 2013 to present.

Publications List organized by type

Books

1. Introduction to Enumerative and Analytic Combinatorics, CRC Press - Chapman Hall, **2015**. This is the second edition of my book Introduction to Enumerative Combinatorics, originally published by McGraw-Hill, in 2005.
2. (as the sole editor) *Handbook of Enumerative Combinatorics*, a comprehensive volume of 1100 pages. *CRC Press - Chapman Hall*, Boca Raton, FL, **2015**.
3. **Combinatorics of Permutations,** a textbook for graduate students, third edition, *CRC Press-Chapman Hall*, **2022**. The first edition was published in 2004, by the same publisher, and the second edition was published in 2012.
4. **A Walk Through Combinatorics**, a textbook for fourth-year undergraduates, 593 pages, *World Scientific.* The book has had five editions, published in 2002, 2006, 2011, 2016 and 2023. (Note: This book has been translated into Korean.)
5. (with Sergey Shabanov) **Concepts in Calculus**, a two-semester calculus textbook, *University Press of Florida*, **2011, 2012**.

Book Chapters

1. A survey of stack sortable permutations. 50 years of combinatorics, graph theory, and computing, 55–72, Discrete Math. Appl. (Boca Raton), CRC Press, Boca Raton, FL, 2020.
2. *On Three Notions of Monotone Subsequences*, in Permutation Patterns, Cambridge University Press, 2010.

Articles on Pattern Avoiding Permutations

1. (with Jay Pantone) Permutations avoiding sets of patterns with long monotone subsequences, *Journal of Symbolic Computation*, **116** (2023), 130–138.
2. (with Alex Burstein) Permutations with exactly one copy of a monotone pattern of length k, and a generalization. Ann. Comb. **26** (2022), no. 2, 393–404.
3. (with Elijah DeJonge) Pattern avoiding permutations with a unique longest increasing subsequence. *Electron. J. Combin.* **27** (2020), no. 4, Paper No. 4.44, 11 pp.
4. Supercritical sequences, and the nonrationality of most principal permutation classes. *European J. Combin.* **83** (2020), 103020, 8 pp.
5. (with Rebecca Smith) Pattern avoidance in permutations and their squares. *Discrete Math.* **342** (2019), no. 11, 3194–3200.
6. (With Michael Cory) Cyclic permutations avoiding pairs of patterns, *Discrete Math. Theor. Comput. Sci.* **21** (2019), no. 2, Paper No. 8, 15 pp.
7. (With Cheyne Homberger, Jay Pantone and Vincent Vatter) *Pattern-Avoiding Involutions: Exact and Asymptotic Enumeration*, Australasian Journal of Combinatorics, **64** (2016), 88–119.
8. *A new record for 1324-avoiding permutations, European Journal of Mathematics* **1** (2015), 198–206.
9. *A new upper bound for 1324-avoiding permutations*, Combinatorics, Probability and Computing, **23** (2014), no. 5, 717–724.
10. *On a family of conjectures of Joel Lewis*, Graphs Combin. **30** (2014), no. 3, 521–526.
11. *Surprising symmetries in objects counted by Catalan numbers,* Electron. J. Combin. **19** (2012), no. 1, Paper 62, 11 pp.
12. *On non-overlapping patterns of permutations*, Pure Math. Appl. (PU. M. A.) **22** (2011), no.2, 99-105.
13. *The absence of a pattern and the number of occurrences of another*, Discrete Math. Theor. Comput. Sci. **12** (2010), no. 2, 89-102.
14. *Where the monotone pattern (mostly) rules*, *Discrete Math.*, **308** (2008), 5782-5788.
15. *New Records on Stanley-Wilf Limits.* European Journal of Combinatorics, **28** (2007), vol. 1, 75-85.
16. *The limit of a Stanley-Wilf sequence is not always rational!*, Journal of Combinatorial Theory, Series A, **110** (2005), 223-235.
17. *A simple proof for the exponential upper bound for some tenacious patterns*, Adv. Appl. Math, **33** no. 1, (2004), 192-198.
18. *A survey of stack sorting disciplines.* Electronic J. Combin., **9** no. 2, (2003).
19. *A simplicial complex of 2-stack sortable permutations.* Advances in Applied Mathematics, **29** (2002), 499-508.
20. *Symmetry and Unimodality in t-stack sortable permutations.* Journal of Combinatorial Theory, **98**, no. 1, (2002), 201-209.
21. (with Bruce Sagan and Vincent Vatter) *Frequency sequences with no internal zeros*, Advances in Applied Mathematics, **28** (2002), 395-420.

22. (with Rodica Simion) *A self-dual poset on objects counted by the Catalan numbers and a type-B analogue*, Discrete Mathematics, Discrete Math. **220** (2000), no. 1-3, 35-49.
23. (with Daniel A. Spielman) *An Infinite Antichain of Permutations,* Electronic Journal of Combinatorics, **7** (2000).
24. *The permutation classes equinumerous to the Smooth class*, Electronic Journal of Combinatorics, **5** (1998).
25. *The Solution of a Conjecture of Stanley and Wilf for all layered patterns.* Journal of Combinatorial Theory, Series A, **85** (1999) 96-104.
26. *2-stack sortable permutations with a given number of ascents.* MSRI Preprint #1997-055.
27. *Permutations with one or two 132-subsequences*, Discrete Mathematics, **181** (1998), 267-274.
28. *Exact enumeration of 1342-avoiding permutations; A close link with labeled trees and planar maps* Journal of Combinatorial Theory, Series A, **80** (1997), 257-272.
29. *The number of permutations with exactly r 132-subsequences of is P-recursive in the size!* Advances in Applied Mathematics, **18** (1997), 510-522.
30. *Permutations avoiding certain patterns; The case of length 4 and generalizations*, Discrete Mathematics **175** (1997) 55-67.

Articles on Analytic Combinatorics

1. (with Boris Pittel), Random increasing plane trees: asymptotic enumeration of vertices by distance from leaves. *Random Structures Algorithms* **63** (2023), no. 1, 102–129.
2. Generating functions of permutations with respect to their alternating runs. *Sém. Lothar. Combin.* **85** ([2020-2021]), Art. B85b, 5 pp.
3. Stack words and a bound for 3-stack sortable permutations. *Discrete Appl. Math.* **284** (2020), 602–605.
4. (with Boris Pittel) On the cycle structure of the product of random maximal cycles. *Sém. Lothar. Combin.* **80** ([2019-2021]), Art. B30b, 37 pp.
5. (with István Mező) Limiting probabilities for vertices of a given rank in 1-2 trees. *Electron. J. Combin.* **26** (2019), no. 3, Paper No. 3.41, 19 pp.
6. (with Boris Pittel) *On a random search tree: asymptotic enumeration of vertices by distance from leaves.* Adv. in Appl. Probab. **49** (2017), no. 3, 850–876.
7. (with Bruce Sagan and Marie-Louise Lackner) *Longest increasing subsequences and log concavity,* Annals of Combinatorics, 15 pages. Published electronically on Aug 17, 2017.
8. *On the number of vertices of each rank in phylogenetic trees and their generalizations,* Discrete Mathematics and Theoretical Computer Science, **18** (2016), no. 3, paper 1431.
9. (with István Mező) *Real zeros and partitions without singleton blocks.* European J. Combin. **51** (2016), 500-510.
10. *k-protected vertices in binary search trees.* Adv. in Appl. Math. **53** (2014), 1–11.

11. (with Andrew Vince), *The Number of Ways to Assemble a Graph*, Elec. J. Combin. **19** no. 4, (2012), P54.
12. (with Philippe Flajolet), *On the Probability that Two Phylogenetic Trees are isomorphic,* Journal of Applied Probability, **46** (2009) vol. 4, 1005–1019.
13. *Generalized Descents and Normality*, Electronic Journal of Combinatorics, **15** (1), 2008, N21.
14. *Real Zeros and Normal Distribution for statistics on Stirling permutations defined by Gessel and Stanley*, SIAM Journal of Applied Mathematics, **23** (2009), no. 1, 401–406.
15. *On a balanced property of compositions*, Online Journal of Analytic Combinatorics, **2** (2007).
16. (with Arnold Knopfmacher) *On the probability that certain pairs of compositions have the same number of parts,* Annals of Combinatorics, **14** (2010) 291–306.
17. *On a balanced property of derangements,* Electronic Journal of Combinatorics, **13** (2006), R102.

Articles on other Combinatorial Enumeration Problems

1. (with Ryan R. Martin), The Endomorphism Conjecture for Graded Posets of Width 4, *Studia Mathematica Hungarica*, to appear.
2. (with Boris Pittel) On the cycle structure of the product of random maximal cycles. 2017 Proceedings of the Fourteenth Workshop on Analytic Algorithmics and Combinatorics (ANALCO), 1–15, SIAM, Philadelphia, PA, 2017.
3. (with Rebecca Smith) An Involution on Involutions and a Generalization of Layered Permutations. Preprint, 10 pages, available at arXiv:1605.06158.
4. *A bijective proof of an identity extending a classic result of Hajós*, preprint, available at arXiv:1203.3264.
5. (with Ryan Flynn) *The average number of block interchanges needed to sort a permutation*, Information Processing Letters, **109** (2009), 927-931.
6. *On two related questions of Wilf Concerning Standard Young Tableaux,* European Journal of Combinatorics, **30** (2009), 1318-1322.
7. (with Bruce Sagan) *On divisibility of Narayana numbers by primes*, Journal of Integer Sequences, **8** (2005), no. 2, Article 05.2.4.
8. *A Combinatorial proof for the log-concavity of a famous sequence enumerating permutations*, Electronic Journal of Combinatorics, **11** no. 2, (2004-2005).
9. *Split and Glue*, preprint.
10. (with Bruce Sagan) *Two injective proofs of a Conjecture of Simion and Sagan*, Journal of Combinatorial Theory, **102** (2003) 212-216.
11. *A simplicial complex of 2-stack sortable permutations.* Advances in Applied Mathematics, **29** (2002), 499-508.
12. (with Andrew MacLennan and Dennis White) *Permutations with Roots*, Random Structures and Algorithms, **17** (2000), no. 2, 157–167.
13. (with Noga Alon and Joel Spencer) *Packing Ferrers Shapes*, Combinatorics, Probability, and Computing, **9** (2000), no. 3, 205–211.

14. (with Richard Ehrenborg) *A combinatorial proof of the log-concavity of the numbers of permutations with k runs*, Journal of Combinatorial Theory, **90** (2000), no. 2. 293-303.
15. (with Michel Bousquet, Gilbert Labelle and Pierre Leroux) *Enumeration of m-ary cacti according to their vertex and degree distributions,* Advances of Applied Mathematics **24** (2000) 22-56.
16. *Partitions with k crossings.* The Ramanujan Journal, **3** (1999) 215-220.
17. *On the Endomorphism Conjecture for Posets with 0*, Order, **14** (1997-1998) 191-192.
18. *A Combinatorial proof of a result of Hetyei and Reiner on Foata-Strehl type permutation trees*, Annals of Combinatorics, **1** (1997) 119-122.

Articles on Mathematical Biology

1. (with Meera Sitharam, Andrew Vince, and Menghan Wang), *Symmetry in Sphere-Based Assembly Configuration Spaces.* Symmetry **8** (2016), no. 1, Art. 5, 26 pp.
2. (with Meera Sitharam and Andrew Vince) *Enumeration of viral capsid assembly pathways: tree orbits under permutation group action,* Bull. Math. Biol. **73** (2011), no. 4, 726—753.
3. (with Meera Sitharam) *The Influence of Symmetry on the Probability of Assembly Pathways for Icosahedral Viral Shells*, Computational and Mathematical Methods in Medicine, **9** (2008), no. 3-4, 295–302.
4. (with Meera Sitharam) *Enumeration of Self-Assembly Pathways for symmetric macromolecular structures*, International Conference on Bioinformatics and its Applications, 2004.

Articles on Magic Squares and Graphs

1. (with Ruriko Yoshida and Hyeong-Kwan Ju) On the enumeration of weighted graphs, *Discrete Applied Mathematics*, **155** (2007), no. 11, 1481-1496.
2. (with Hyeong-Kwan Ju) *Enumerating Solutions of a System of Linear Inequalities related to Magic Squares*, Annals of Combinatorics, **10** (2006), vol. 2, 179-191.
3. *A New Proof of the Formula for the number of the* 3×3 *Magic Squares,* Mathematics Magazine, **70** (1997), 201-203.
4. *Sur l'énumeration des cubes magiques,* Comptes Rendus de l'Academie des Sciences, **316** (1993) 636-639.

Articles on Ramsey Theory

1. (with Géza Tóth) *A Ramsey-type problem on right-angled triangles in space*, Discrete Mathematics, **150** (1996), 61-67.
2. *A Euclidean Ramsey Theorem*, Discrete Mathematics, **122** (1993), 349-352.
3. *Coloring space,* Mathematical Spectrum, **20** (1988), 71-73.

TEACHING

Course Development

1. Regularly teaches two honors courses in addition to regular teaching load: Calculus Gems in the Spring , and Proofs from the Book in the Fall.

2. One of two authors on the Online Calculus Initiative of the University of Florida.
3. Taught previously unavailable graduate courses on the Probabilistic Method in Combinatorics, on Analytic Combinatorics, Combinatorics of Permutations, and on Standard Young Tableaux.

Graduate Students

1. Alexander Wong, current.
2. Mario Midence, Ph.D. 2023, currently a lecturer at the University of Kentucky.
3. Keith Copenhaver, Ph. D. 2019, currently an Assistant Professor at Eckerd College.
4. Anthony Van Duzer, Ph. D. 2019, currently working as a mathematician for a slot machine manufacturer in Reno, NV.
5. Daniel Gray, Ph. D. 2015, currently an Instructor at Georgia Southern University.
6. Cheyne Homberger, Ph. D. 2014, currently the technical leader of Operations Research at the NSA.
7. Micah Coleman, Ph. D. 2008, currently a researcher at the Georgia Tech Research Institute, in Atlanta, GA.
8. Daniel Warren, Ph. D. 2005, currently a lecturer at UTexas at Arlington. Formerly a Sheldon Ross Assistant Professor at the Ohio State University, in Columbus, OH.
9. Rebbecca Smith, Ph.D. 2005, currently a Professor at SUNY Brockport, in Brockport, NY.
10. William Griffiths, Ph. D. 2004, currently an Associate Professor at Kennesaw State University, in Atlanta, GA.
11. Aziza Jefferson, 2009-2012. (Graduated as a student of Vincent Vatter.) Currently at the NSA.

Postdoctoral Advisee

1. Hua Wang, John Thompson Research Assistant Professor at the University of Florida, 2005–2008. Currently a Professor at Georgia Southern University, in Statesboro, GA.

Undergraduate Mentees

(All supported by the UF Scholars Program.)

1. Nicholas van Nimwegen, 2023-2024.
2. Benjamin Car, 2021-2022.
3. Michael Cory, 2017-2018, currently working for Capital One at Washington DC.
4. Samuel Rizzo, 2016-2017, currently a graduate student at Vanderbilt.
5. Colin Defant, 2015-2016, Won a Barry Goldwater Scholarship. Got a Ph.D. in Princeton. Currently an NSF postdoc at MIT.
6. Mark Hertz, 2014-2015, supported by the UF Scholars Program. Got a Master's degree at Virginia Tech.
7. Ryan Flynn, 2006-2008, supported by the Howard Hughes Medical Institute, and by the UF Scholars Program. Currently an instructor at Penn State.

8. Michael Skobel, 2004-2005. Currently the president of Skobel Law PA, in Miami, FL.
9. Micah Coleman, 2003-2004, currently working at Georgia Tech Research Institute.
10. Aleksandr Vayner, 2001-2002.

Teaching Awards

1. Teaching Award of the College of Liberal Arts and Sciences, University of Florida, 2004. (Nine awards given to the 39-department college.)
2. Teaching Award, Department of Mathematics, University of Pennsylvania, 2005.

Selected Service

1. Main Organizer, Miniworkshop on Permutation Patterns, Oberwolfach Mathematical Research Institute, Oberwolfach, Germany, January 28 - February 2, 2024.
2. Main Organizer, Workshop on Pattern Avoidance, Computer Science, and Mathematical Physics, Leibniz Institute, Dagstuhl, Germany, March 19–24, 2023.
3. Main Organizer, Workshop on Analytic and Probabilistic Combinatorics, Banff, AB, Canada, November 13–18, 2022,
4. Main Organizer, Workshop on Pattern Avoidance, Molecular Biology, and Mathematical Physics, Leibniz Institute, Dagstuhl, Germany, November 5–9, 2018.
5. Chair of Graduate Admissions Committee at the Department of Mathematics, 2017–2019 and 2020–present. Visits the annual NAM Mathfest as an graduate recruiter.
6. Served five two-year terms on the departmental Steering Committee.
7. Main Organizer, Workshop on Analytic and Probabilistic Combinatorics, Banff, AB, Canada, October 23-28, 2016.
8. Main Organizer, Workshop on Pattern Avoidance and Molecular Biology, Leibniz Institute, Dagstuhl, Germany, February 15-19, 2016.
9. Co-organizer of AMS Special Sessions at Sectional Meetings in 2019 and 2022.
10. Co-organizer of AMS Special Sessions at Annual Meetings in 2019 and 2020.
11. Reviewer of books for Choice Magazine, the Mathematical Association of America, and of books and articles for Mathematical Reviews.

References

Prof. Richard P. Stanley, Dept. of Mathematics, MIT, Cambridge, MA.
Prof. Robin Pemantle, Dept. of Math., University of Pennsylvania, Philadelphia, PA.
Prof. Rodney Canfield, Dept. of Computer Science, University of Georgia, Athens, GA.
Prof. Bruce Sagan, Dept. of Math., Michigan State University, East Lansing, MI.
Prof. László Székely, Dept. of Math., University of South Carolina, Columbia, SC.
Prof. Catherine Yan, Dept. of Math., Texas AM University, College Station, TX.