

Curriculum Vitae

DILIP RAGHAVAN

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Education

- 2008 Ph.D. University of Wisconsin–Madison, Mathematics (Advisors: K. Kunen, B. Kastermans). Minor: Philosophy
- 2008 M.A. University of Wisconsin–Madison, Mathematics

Employment

- 07/19 – Associate Professor, National University of Singapore (Tenured)
- 08/12 – 07/19 Assistant Professor, National University of Singapore (Tenure-track)
- 07/11 – 08/12 JSPS Postdoctoral Fellow, Kobe University (Mentor: Jörg Brendle)
- 07/08 – 06/11 Postdoctoral Assistant Professor, Dept. of Mathematics, University of Toronto (Mentors: Stevo Todorčević and Juris Steprāns)
- 09/01 – 05/08 Teaching Assistant and Research Assistant, Dept. of Mathematics, UW–Madison (also ran orientation program for incoming international TAs)

Awards

- 2011 JSPS Postdoctoral Fellowship, Japan Society for the Promotion of Science, Japan.
- 2008 The Sacks Prize, Association for Symbolic Logic.
(awarded for the most outstanding doctoral dissertation in mathematical logic throughout the world)

Grants

Grants received as Principal Investigator (PI)

- 07/18 – 07/21 Ministry of Education Tier 2 grant No. MOE2017-T2-2-125.
(awarded by Ministry of Education (Singapore); S\$533,768)
- 04/15 – 09/18 National University of Singapore AcRF Tier 1 grant No. R-146-000-211-112.
(awarded by Ministry of Education (Singapore); S\$109,000)
- 07/11 – 08/12 Grant-in-Aid for Scientific Research for JSPS Fellows No. 23-01017.
(awarded by Japan Society for the Promotion of Science; ¥ 1.6 million)

Grants received as Co Principal Investigator (Co-PI)

10/13 – 09/16 Ministry of Education Tier 2 grant No. MOE2013-T2-1-062.

(awarded by Ministry of Education (Singapore); S\$287,100; PI: Frank Stephan)

04/14 – 03/16 NUS and JSPS joint grant Nos. R-146-000-192-133 and R-146-000-192-733.

(awarded jointly by National University of Singapore and Japan Society for the Promotion of Science; S\$38,000; PIs: Chong Chi Tat and Kazayuki Tanaka)

Research interests

Mathematical Logic, Set Theory, and General Topology.

Research Papers

1. (with K. Kunen) *Gregory trees, the continuum, and Martin's axiom*, **J. Symbolic Logic** 74 (2009), no. 2, 712–720.
2. *Maximal almost disjoint families of functions*, **Fund. Math.** 204 (2009), no. 3, 241–282.
3. *There is a Van Douwen mad family*, **Trans. Amer. Math. Soc.** 362 (2010), no. 11, 5879–5891.
4. *Almost disjoint families and diagonalizations of length continuum*, **Bull. Symbolic Logic** 16 (2010), no. 2, 240–260.
5. *A model with no strongly separable almost disjoint families*, **Israel J. Math.** 189 (2012), no. 1, 39–53.
6. (with J. Steprāns) *On weakly tight families*, **Canad. J. Math.** 64 (2012), no. 6, 1378–1394.
7. (with S. Todorcevic) *Cofinal types of ultrafilters*, **Ann. Pure Appl. Logic** 163 (2012), no. 3, 185–199.
8. (with S. Shelah) *Comparing the closed almost disjointness and dominating numbers*, **Fund. Math.** 217 (2012), no. 1, 73–81.
9. *P-ideal dichotomy and weak squares*, **J. Symbolic Logic** 78 (2013), no. 1, 157–167.
10. (with T. Yorioka) *Suslin lattices*, **Order** 31 (2014), no. 1, 55–79.
11. (with H. Mildenberger and J. Steprāns) *Splitting families and complete separability*, **Canad. Math. Bull.** 57 (2014), no. 1, 119–124.
12. (with J. Brendle) *Bounding, splitting, and almost disjointness*, **Ann. Pure Appl. Logic** 165 (2014), no. 2, 631–651.
13. (with S. Todorcevic) *Combinatorial dichotomies and cardinal invariants*, **Math. Res. Lett.** 21 (2014), no. 2, 379–401.
14. (with A. Blass and N. Dobrinen) *The next best thing to a P-point*, **J. Symbolic Logic** 80 (2015), no. 3, 866–900.
15. (with S. Shelah) *On embedding certain partial orders into the P-points under RK and Tukey reducibility*, **Trans. Amer. Math. Soc.** 369 (2017), no. 6, 4433–4455.
16. (with S. Shelah) *Two inequalities between cardinal invariants*, **Fund. Math.** 237 (2017), no. 2, 187–200.
17. (with P. B. Larson) *Real games and strategically selective coideals*, in *Sets and computations*, **Lect. Notes Ser. Inst. Math. Sci. Natl. Univ. Singap.** 33 (2017), pp. 45–54.
18. (with R. Hölzl, F. Stephan, and J. Zhang) *Weakly represented families in reverse mathematics*, in *Computability and complexity*, **Lecture Notes in Comput. Sci.** 10010 (2017), Springer, Cham., pp. 160–187.

19. (with S. Todorcevic) *Suslin trees, the bounding number, and partition relations*, **Israel J. Math.** 225 (2018), no. 2, 771–796.
20. (with B. Kuzeljevic) *A long chain of P -points*, **J. Math. Log.** 18 (2018), no. 1, 1850004, 38 pp.
21. (with S. Shelah) *Two results on cardinal invariants at uncountable cardinals*, in **Proceedings of the 14th and 15th Asian Logic Conferences** (Edited by: B. Kim, J. Brendle, G. Lee, F. Liu, R. Ramanujam, S. M. Srivastava, A. Tsuboi, and L. Yu), *World Scientific Publishing Co. Pte. Ltd.*, Hackensack, NJ (2019), pp. 129–138.
22. (with J. Verner) *Chains of P -points*, **Canad. Math. Bull.** 62 (2019), no. 4, 856–868.
23. (with S. Shelah) *A small ultrafilter number at smaller cardinals*, **Arch. Math. Logic** 59 (2020), no. 3–4, 325–334.
24. *The density zero ideal and the splitting number*, **Ann. Pure Appl. Logic** 171 (2020), no. 7, 102807, 15pp.
25. (with K. Higuchi, S. Lempp, and F. Stephan) *On the order dimension of locally countable partial orderings*, **Proc. Amer. Math. Soc.** 148 (2020), no. 7, 2823–2833.
26. (with A. Kumar) *Separating families and order dimension of Turing degrees*, **Ann. Pure Appl. Logic** (special issue marking the 50th Anniversary of the Toronto Set Theory Seminar), to appear.
27. (with S. Todorcevic) *Proof of a conjecture of Galvin*, **Forum of Mathematics Pi**, to appear.
28. (with R. Johnston) *Complexity of index sets of descriptive set-theoretic notions*, submitted.
29. (with J. Brendle, O. Guzmán, and M. Hrušák) *Combinatorial properties of MAD families*, in preparation.
30. (with J. Steprāns) *The almost disjointness number in higher dimensions*, in preparation.
31. (with S. Shelah) *On the reaping number at the first Mahlo cardinal*, in preparation.
32. (with S. Todorcevic) *Galvin’s problem in higher dimensions*, in preparation.
33. (with S. Shelah) *Boolean ultrapowers and iterated forcing*, in preparation.
34. (with B. Kuzeljevic and J. Verner) *Lower and upper bounds of sets of P -points*, in preparation.

Talks and Presentations

Invited talks

- 2019 Aug. *Higher cardinal invariants I-II (two hours of lectures)*, Logic Colloquium 2019, Prague, Czech Republic.
- 2019 Aug. *Higher cardinal invariants I-II (two hours of lectures)*, Workshop on Set theory of the Reals, Casa Matemática Oaxaca, CMO-BIRS, Oaxaca, México.
- 2019 Jul. *Order dimension of locally countable partial orders*, 34th Summer Conference on Topology and its Applications, University of the Witwatersrand, Johannesburg, Gauteng, South Africa.
- 2019 May *Order dimension of locally countable partial orders*, A Celebration of the 50th Anniversary of the Toronto Set Theory Seminar, Fields Institute, Toronto, Canada.
- 2019 Feb. *A small ultrafilter number*, Mathematical Colloquium, Mathematical Institute of the Serbian Academy of Sciences and Arts, Belgrade, Serbia.
- 2018 Nov. *Large cardinals and Ramsey theory I–III (three hours of lectures)*, Workshop on Axiomatic set theory and its applications, RIMS, Kyoto, Japan.

- 2018 Jul. *Some results on cardinal invariants above the continuum*, Novi Sad Conference in Set Theory and General Topology, University of Novi Sad, Novi Sad, Serbia.
- 2018 Jun. *Proof of a conjecture of Galvin*, Conference on Ideals and exceptional sets in Polish spaces, Bernoulli Center, EPFL, Lausanne, Switzerland.
- 2018 Jun. *Boolean ultrapowers and iterated forcing I–IV (six hours of lectures)*, Appalachian set theory workshop, Carnegie Mellon University, Pittsburgh, PA, USA.
- 2017 Jul. *Boolean ultrapowers and iterated forcing*, Sixth European Set Theory Conference, Budapest, Hungary.
- 2017 Feb. *Boolean ultrapowers and iterated forcing*, Set Theory Workshop, held at The Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany.
- 2016 Sep. *More on the density zero ideal*, Workshop on Set Theory and its Applications in Topology, CMO-BIRS, Oaxaca, México.
- 2015 Nov. *Real games and strategically selective coideals*, 1st Pan Pacific International Conference on Topology and Applications, Min Nan Normal University, Zhangzhou, China.
- 2015 Sep. *Cardinal invariants of density*, Computability Theory and the Foundations of Mathematics 2015 (in honor of Kazuyuki Tanaka’s 60th birthday), Tokyo Institute of Technology, Tokyo, Japan.
- 2015 Jun. *Cardinal invariants of density*, The BLAST conference, 2015, University of North Texas, Denton, TX, USA.
- 2015 Jan. *Plenary lecture: On embedding certain partial orders into the P -points under Tukey and RK reducibility*, 14th Asian Logic Conference, Mumbai, India.
- 2014 Dec. *On embedding certain partial orders into the P -points under Tukey and RK reducibility*, conference in honor of Alan Dow, Cornell university, Ithaca, USA.
- 2014 Sep. *On embedding certain partial orders into the P -points under Tukey and RK reducibility*, IMS-JSPS Joint Workshop in Mathematical Logic and Foundations of Mathematics, Singapore.
- 2014 Jun. *Suslin trees and partition relations*, Logic Symposium at the Annual Ramanujan Mathematical Society meeting, Pune, India.
- 2014 Jan. *Constructing special almost disjoint families I–III (3 hours of lectures)*, Winter School in abstract analysis, Hejnice, Czech Republic.
- 2013 Sep. *Suslin trees and partition relations*, Asian Logic Conference, Guang Zhou, China.
- 2013 Sep. *Almost disjoint families and cardinal invariants*, 6th Japan Mexico Topology Symposium, Shimane University, Matsue, Japan.
- 2013 Jul. *Combinatorial dichotomies and cardinal invariants*, Sy David Friedman’s 60th-Birthday Conference, Vienna, Austria.
- 2013 May. *Combinatorial dichotomies and cardinal invariants*, 2013 North American Annual Meeting of ASL, Waterloo, Canada.
- 2012 Jul. *Bounding, splitting, and almost disjointness*, Logic Colloquium 2012, Manchester, UK.
- 2012 Jun. *Bounding, splitting, and almost disjointness*, 15th Latin American Symposium on Mathematical Logic, Bogota, Colombia.
- 2012 Jan. *Suslin Lattices*, Joint FWF-JSPS seminar on forcing in set theory, Kobe, Japan.
- 2011 Oct. *P -ideal dichotomy and weak squares*, RIMS Set Theory Workshop 2011, Kyoto, Japan.
- 2011 Mar. *P -ideal dichotomy and weak squares*, Young set theory workshop, Königswinter, Germany.
- 2010 Dec. *Embedding partial orders into the P -points under Tukey reducibility*, Cornell logic seminar, Cornell University, Ithaca, New York.
- 2010 Oct. *Suslin Lattices*, Rutgers 2010 MAMLS Conference, Rutgers University, New Jersey.

- 2010 Sep. I declined an invitation to speak at the Japan-Mexico International Conference on Topology and its Applications V, Colima, Mexico.
- 2010 Apr. *A model with no strongly separable MAD families*, Boise Extravaganza in Set Theory, Boise, Idaho.
- 2010 Mar. *Plenary Lecture: Cofinal types of ultrafilters*, 2010 Annual Meeting of the Association for Symbolic Logic, Washington, DC.
- 2010 Feb. *A model with no strongly separable MAD families*, SEALS conference, University of Florida, Gainesville, Florida
- 2010 Feb. *Cofinal types of ultrafilters*, Miami University, Oxford, Ohio.
- 2010 Jan. *Cofinal types of ultrafilters*, MIT logic seminar, MIT, Cambridge, Massachusetts.
- 2009 Nov. *A model with no strongly separable MAD families*, Workshop on combinatorial set theory and forcing theory, Kyoto University, Japan.
- 2009 Aug. *Cofinal types of ultrafilters*, BLAST 2009, New Mexico State University, Las Cruces.
- 2009 Jul. *Cofinal types of ultrafilters*, Second European set theory meeting in honor of Ronald Jensen, Będlewo, Poland.
- 2009 Jan. *Suslin lattices*, VIG in honor of John Steel, UCLA.
- 2008 Sep. *Definability of MAD Families in ω^ω* , Model Theory Seminar, McMaster University.
- 2008 Mar. *Solution to a Problem of Van Douwen*, Spring Topology and Dynamical Systems Conference, Milwaukee.

Workshop Invitations and Invited Research Visits

- 2020 Apr. *Invited to participate in the Set Theory Workshop held from April 5–11, 2020*, hosted by Mathematisches Forschungsinstitut Oberwolfach, Germany (the workshop was canceled because of the pandemic).
- 2019 Sep. *Invited to participate in the Fifteenth International Workshop on Set Theory held from September 23–27, 2019*, hosted by CIRM, Luminy, Marseille, France.
(I was unable to participate due to personal reasons.)
- 2018 Apr. *Invited to participate in the conference on Set Theory, Model Theory and Applications (In memory of Mati Rubin) held from April 22–26, 2018*, hosted by Ben-Gurion University of the Negev (Eilat Campus), Eilat, Israel.
- 2017 Oct. *Invited to participate in the Fourteenth International Workshop on Set Theory held from October 9–13, 2017*, hosted by CIRM, Luminy, Marseille, France.
- 2017 Feb. *Invited to participate in the Set Theory Workshop held from February 12–18, 2017*, hosted by Mathematisches Forschungsinstitut Oberwolfach, Germany.
- 2016 Jan. *Invited to participate in the workshop on High and low forcing held from January 11–15, 2016*, hosted by AIM, Palo Alto, CA, USA.
- 2014 Oct. *Invited to participate in the Thirteenth International Workshop on Set Theory held from September 29–October 3, 2014*, hosted by CIRM, Luminy, Marseille, France.
- 2014 Jan. *Invited to participate in the Set Theory Workshop held from January 12–18, 2014*, hosted by Mathematisches Forschungsinstitut Oberwolfach, Germany.
- 2012 Oct. *Invited to participate in the Thematic Program on Forcing and its Applications held from July–Dec., 2012*, hosted by the Fields Institute, Canada.
- 2011 Jan. *Invited to participate in the Set Theory Workshop held from January 9–15, 2011*, hosted by Mathematisches Forschungsinstitut Oberwolfach, Germany.
- 2010 Dec. *Invited visit to Cornell University, Ithaca, NY*, hosted by Justin Moore.
- 2010 Oct. *Invited visit to Rutgers University, New Jersey*, hosted by Saharon Shelah.

2010 Aug. *Invited visit to Institute of Mathematical Sciences*, Chennai, hosted by R. Ramanujam.

2009 Jul. *Invited visit to University of Paris VII*, hosted by Veličković.

2009 Apr. *Invited visit to UCLA*, hosted by Itay Neeman and UCLA Logic Center. I gave a series of four lectures at the logic seminar in UCLA.

Contributed talks

2010 Aug. *Cofinal types of ultrafilters*, ICM satellite event on logic and set theory, Chennai, India.

2008 Mar. *Solution to a Problem of Van Douwen*, Boise Extravaganza in Set Theory, Boise, Idaho.

Mentoring of Junior Researchers

Postdoctoral fellows mentored

08/20 – 08/21 Ming Xiao, National University of Singapore.

09/19 – 09/20 Thilo Weinert, National University of Singapore.

09/18 – 03/20 Ashutosh Kumar, National University of Singapore.

(Current position: Tenure Track Assistant Professor,
Indian Institute of Technology – Kanpur, Kanpur, UP, India.)

08/15 – 08/16 Borisa Kuzeljevic, National University of Singapore.

(Current position: Tenure Track Assistant Professor,
The University of Novi Sad, Novi Sad, Serbia.)

Professional activities

Journals refereed

- Annals of Combinatorics, Annals of Pure and Applied Logic, Archive for Mathematical Logic, Canadian Journal of Mathematics, Fundamenta Mathematicae, Israel Journal of Mathematics, Journal of Symbolic Logic, Journal of Mathematical Logic, Journal of Logic and Analysis, Mathematical Logic Quarterly, Mathematical Research Letters, Monatshefte für Mathematik, Notre Dame Journal of Formal Logic, Order, Proceedings of the American Mathematical Society, Topology and its Applications, Transactions of the American Mathematical Society.

Grant applications refereed

- Served on NSF grants review panel (Foundations panel).
- Reviewed grant applications for ERC, the European Research Council
- Reviewed grant applications for ÖAW, the Austrian Academy of Sciences.

Dissertation committees

- Birzhan Moldagaliyev (NUS, August, 2018).
- Claribet Piña (University of Paris Diderot–Paris VII, June, 2015).
- Li Wei (NUS, May, 2013).

Conferences organized

2021 Aug. I served on the *program committees* of *The Young Set Theory Workshop* and *The Novi Sad Conference in Set Theory and General Topology* held back-to-back in Novi Sad, Serbia.

2020 Nov. I served on the *scientific committee* of the workshop on *Set Theory: Reals and Topology* to be held at RIMS, Kyoto, Japan (the workshop was moved online due to the pandemic).

2017 Sep. I served on the *program committee* for the *Computability Theory and the Foundations of Mathematics (CTFM)* conference held in Singapore.

- 2015 Apr. I was a co-organizer of *Sets and Computations*, a five week long workshop on set theory, computability theory, and their interactions which was held at the *Institute of Mathematical Sciences (IMS)* in Singapore from March 30–April 30, 2015. I was also a co-editor of the proceedings volume from this workshop.
- 2012 May I served on the *program committee* of the *Young Set Theory Workshop, 2012* held in Lumińy, France.
- 2012 Apr. I was a co-organizer of the *Special Session in Set Theory* at the *2012 ASL North American Annual Meeting* held in Madison, WI.
- 2009 Apr. I was a co-organizer of *KunenFest*, a conference in Set Theory and Set Theoretic Topology in honor of Kenneth Kunen on his retirement.

Teaching activities

Courses taught at NUS:

- Undergraduate Topics in Mathematics II (MA4292)
- Logic and Foundations of Mathematics I (MA5219)
- Logic and Foundations of Mathematics II (MA5220)
- Set Theory (MA3205)
- Introduction to Mathematical logic (MA4207)
- Freshman Seminar (FMS1209M) (seminar topic was Philosophy of Mathematics)
- Linear Algebra I (MA1101R) (large lecture course; average enrollment of 200 to 400 students)
- Model Theory (MA6220)

I was responsible for all aspects of the above courses, including formulating the syllabus.

Undergraduate students advised at NUS:

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|-----------|---|
| 2020–2021 | Qi Ji, Honors Thesis: <i>Models of set theory without choice</i> |
| 2020–2021 | Vincent Tandy, Honors Thesis: <i>The Sensitivity conjecture</i> |
| 2018–2019 | Zhang Jiang, Honors Thesis: <i>Amenable groups</i> |
| 2017–2018 | Kishan Subramaniam, Honors Thesis: <i>The Banach–Tarski Paradox</i> |
| 2016–2017 | Leow Wei Xiang, Honors Thesis: <i>Formalization of set theory in COQ</i> |
| 2014–2015 | Desmond Lau, Honors Thesis: <i>A general preservation theorem for RCS iteration of semiproper forcing notions</i> |
| 2013–2014 | Heng Teng Boon, Honors Thesis: <i>Large cardinals and cardinal arithmetic</i> |

Courses taught at The University of Toronto:

- Introduction to Combinatorics (MAT344)
- Linear Algebra II (MAT224)
- Introduction to Ordinary Differential Equations (MAT244) (large lecture course)
- Calculus II (for engineers) (MAT187) (large lecture course)

I was responsible for most aspects of the above courses.

Courses taught as a Teaching Assistant at UW–Madison:

- Calculus and Analytic Geometry II (Math 222)
- Discrete Mathematics (Math 240)
- Precalculus (Math 114)
- Calculus with Algebra and Trigonometry I (Math 171)
- Calculus with Algebra and Trigonometry II (Math 217)
- Business Calculus (Math 211)

- Trigonometry (Math 113)

As a TA for the above courses, I was responsible for showing the students how to solve selected homework problems, for working out key and illustrative examples, answering questions, conducting review sessions and giving the students regular feedback by grading HW assignments and quizzes.

Other Teaching Activities at UW–Madison:

- TA Coordinator (mentor and observe incoming TAs assigned to a lecture)
- International TA Training (mentor, observe and train incoming international TAs)

Membership in Professional Organizations

- Association for Symbolic Logic

Other Organizational Activities

- I was a departmental steward for the Teaching Assistants' Association
(The graduate students' Labor Union at UW–Madison)

References

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