Philipp Schlicht | *CV*

Institute for Mathematics, University of Vienna
Kolingasse 14-16, 1090 Vienna, Austria

+49 17681682542 • philipp.schlicht@univie.ac.at
https://philippschlicht.github.io

Personal information

Date and place of birth: 16 October 1978, Bielefeld, Germany
Nationality: Germany

Past and present employment

04/2021 – 08/2021: Temporary associate professor (W2) (Vertretungsprofessur, substitute for unfilled position), Mathematical Institute, University of Bonn, Germany

10/2020 – 03/2021: Postdoctoral researcher, Faculty of Mathematics, University of Vienna, Austria

09/2020: Marie Curie research fellow, School of Mathematics, University of Bristol, UK

07/2020 – 08/2020: Research fellow, School of Mathematics, University of Bristol

07/2018 – 06/2020: Marie Curie research fellow, School of Mathematics, University of Bristol

03/2018 – 06/2018: Postdoctoral researcher, Department of Computer Science, University of Auckland, New Zealand

02/2011 – 02/2018: Fixed-term assistant professor (Akademischer Rat auf Zeit), Mathematical Institute, University of Bonn, Germany

04/2015 – 03/2016: Temporary associate professor (W2) (Vertretungsprofessur, substitute for unfilled position), Institute for Mathematical Logic and Foundations, University of Münster, Germany

10/2015 – 11/2015: Invited researcher, Isaac Newton Institute, Cambridge, UK

06/2014: Invited researcher, Institute for Mathematical Sciences, National University of Singapore

08/2009 – 12/2009: Invited researcher, Mittag-Leffler Institute, Djursholm, Sweden

11/2008 – 02/2011: Postdoctoral researcher, Hausdorff Center, Bonn

06/2004 – 08/2008: Research assistant, Institute for Mathematical Logic and Foundations, University of Münster

Education

12/2017: Habilitation in mathematics, University of Bonn; Title: Topics in generalized and classical descriptive set theory; Head of committee: Prof. Peter Koepke

10/2008: Doctor rerum naturalium (doctor in sciences) in mathematics, magna cum laude, University of Münster; Doctoral thesis: Thin equivalence relations in $L(\mathbb{R})$ and inner models; Supervisor: Prof. Ralf Schindler

9/2005 – 8/2006: Visiting scholar, University of California, Los Angeles

5/2004: Diplom (master) in mathematics, grade 1.0 (highest), University of Munich (LMU);
Thesis: Classifying Borel equivalence relations; Supervisor: Prof. Dieter Donder

Research

My research is situated in Mathematical Logic, in the subfields of Set Theory and Computability. The main directions are:

- *Descriptive set theory, forcing and large cardinals.* My doctoral thesis was on projective equivalence relations. Specifically, I applied inner model theory to results on projective sets. This topic makes essential use of the technique of forcing and large cardinals, two central themes in contemporary set theory. I continue this direction in recent research projects on projective absoluteness.
- *Generalised descriptive set theory.* This is a relatively recent research field that aims to extend known results from Cantor space to generalised Cantor spaces, which consist of sequences of a fixed regular length. I work on extension of structural results for the Cantor spaces to this situation, concentrating on regularity properties and determinacy of infinite games.
- *Connections between descriptive set theory and computability.* The field studying these connections is called effective descriptive set theory. Certain applications that I worked on concern strong randomness notions for infinite strings.
- *Automatic structures.* I concentrate on automata on ordinals. Decidability properties of these structures are preserved, but the class is strictly larger than that of automatic structures. I am fascinated by the properties of these structures and the search for dividing lines.

Teaching

- Lecture courses
  - Winter 2017, Bonn: Advanced mathematical logic: model theory, with Philipp Lücke
  - Summer 2016, Bonn: Advanced topics in mathematical logic, with Philipp Lücke
  - Winter 2015, Münster: Logik II - Einführung in die Mengenlehre (in German)
  - Summer 2015, Münster: Logik I - Einführung in die Mathematische Logik (in German)
  - Winter 2014, Bonn: Introduction to set theory, with Philipp Lücke
  - Summer 2014, Bonn: Advanced topics in mathematical logic, with Philipp Lücke
  - Summer 2013, Bonn: Descriptive set theory, with Stefan Geschke
  - Summer 2012, Bonn: Iterated ultrapowers
- Seminar series
  - 2011-17: 13 seminar series in mathematics for bachelor and master students in Bonn and Münster, taught jointly with Ralf Schindler, Peter Koepke, Stefan Geschke, Philipp Lücke and Peter Holy
- Assisting with lecture courses and preparation of problem sheets
  - 2011-16: Organisation of tutorial sessions and preparation of problem sheets for 7 lecture courses of Peter Koepke and Stefan Geschke on Introduction to Mathematical Logic, Intruduction to Set Theory, Modeels of Set Theory I and II, Mathematics for Physicists
- Organisation of research seminars
  - Winter 2009-Winter 2014, Bonn: Oberseminar Mathematische Logik, with Peter Koepke, Stefan Geschke and and Philipp Lücke
- Advised and co-advised theses
  - Supervised 2 bachelor theses in Bonn and Bristol, co-supervised 3 master and 1 bachelor theses in Bonn, helped supervise 4 Ph.D., 6 master and 3 bachelor theses

Selected articles (chosen by venue or impact)

1. Lebesgue's density theorem and definable selectors for ideals, with Sandra Müller, David Schrittesser and Thilo Weinert
   accepted for Israel Journal of Mathematics in February 2021, 29 pages
2. Long games and sigma-projective sets, with Juan P. Aguilera and Sandra Müller
   Annals of Pure and Applied Logic (appeared online, January 2021), 23 pages

3. Preserving levels of projective determinacy by tree forcings, with Fabiana Castiblanco
   Annals of Pure and Applied Logic (appeared online, November 2020), 30 pages
4. How to have more things by forgetting how to count them, with Asaf Karagila
   Proceedings of the Royal Society A, Volume 476, Issue 2239 (2020), 1-12
5. The exact strength of the class forcing theorem, with Victoria Gitman, Joel David Hamkins, Peter Holy and Kameryn Williams,
   Journal of Symbolic Logic (appeared online, July 2020), 37 pages
6. Characterizations of pretameness and the Ord-cc, with Peter Holy et Regula Krapf
   Annals of Pure and Applied Logic 169, 8 (2018), 775-802
7. Randomness via infinite computation and effective descriptive set theory, with Merlin Carl
   Journal of Symbolic Logic 83, 2 (2018), 766-789
8. Recognizable sets and Woodin cardinals: Computation beyond the constructible universe, with Merlin Carl and Philip Welch
   Annals of Pure and Applied Logic, Volume 169, 4 (2018), 312-332
9. A hierarchy of Ramsey-like cardinals, with Peter Holy
   Fundamenta Mathematicae 242 (2018), 49-74
10. Perfect subsets of generalized Baire spaces and long games
    Journal of Symbolic Logic 82, 4 (2017), 1317-1355
11. Σ_1-definable subsets of $H(\omega_2)$, with Philipp Lücke and Ralf Schindler
    Journal of Symbolic Logic 82, 3 (2017), 1106-1131
12. Class forcing, the forcing theorem and Boolean completions, with Regula Krapf, Philipp Lücke and Ana Njegomir
    Journal of Symbolic Logic 81, 4 (2016), 1500-1530
13. The Hurewicz dichotomy for generalized Baire spaces, with Philipp Lücke and Luca Motto Ros
    Israel Journal of Mathematics 216, no. 2 (2016), 973-1022
14. Continuous images of closed sets in generalized Baire spaces, with Philipp Lücke
    Israel Journal of Mathematics 209, 1 (2015), 421-461
15. Wadge-like reducibilities in arbitrary quasi-Polish spaces, with Luca Motto Ros and Victor Selivanov
    Mathematical Structures in Computer Science 25, no. 8 (2015), 1705-1754
16. Thin equivalence relations and inner models
    Annals of Pure and Applied Logic 165, 10 (2014), 1577-1625
17. Automata on ordinals and automaticity of linear orders, with Frank Stephan
    Annals of Pure and Applied Logic 164, 5 (2013), 523-527
18. A minimal Prikry-type forcing for singularizing a measurable cardinal, with Karen Räsch and Peter Koepke
    Journal of Symbolic Logic 78, 1 (2013), 85-100

Articles in journals or books

1. Lebesgue's density theorem and definable selectors for ideals, with Sandra Müller, David Schrittesser and Thilo Weinert, 29 pages
   accepted for Israel Journal of Mathematics in February 2021
2. Long games and sigma-projective sets, with Juan P. Aguilera and Sandra Müller, 23 pages
   Annals of Pure and Applied Logic (appeared online, January 2021)
3. Descriptive properties of higher Kurepa treess, with Philipp Lücke, 16 pages
   accepted in December 2020 for the book "Research Trends in Contemporary Logic", College Publications
4. Preserving levels of projective determinacy by tree forcings, with Fabiana Castiblanco, 30 pages
   Annals of Pure and Applied Logic (appeared online, November 2020)

5. How to have more things by forgetting how to count them, with Asaf Karagila
   Proceedings of the Royal Society A, July 2020, Volume 476, Issue 2239 (2020), 1-12
6. The exact strength of the class forcing theorem, with Victoria Gitman, Joel David Hamkins, Peter Holy and Kameryn Williams,
   Journal of Symbolic Logic (appeared online, July 2020), 37 pages
7. Reachability of infinite time Turing machines with long tapes, with Merlin Carl and Benjamin Rin
   Logical Methods in Computer Science 16, 2 (2020), 1-16
8. The isomorphism problem for tree-automatic ordinals with addition, with Sanjay Jain, Bakhadyr Khoussainov, and Frank Stephan
   Information Processing Letters 149 (2019), 19-24
9. Sufficient conditions for the forcing theorem, and turning proper classes into sets, with Peter Holy and Regula Krapf
   Fundamenta Mathematicae 246 (2019), 27-44
10. Borel subsets of the real line and continuous reducibility, with Daisuke Ikegami and Hisao Tanaka
    Fundamenta Mathematicae 244 (2019), 209-241
11. A hierarchy of Ramsey-like cardinals, with Peter Holy
    Fundamenta Mathematicae 242 (2018), 49-74
12. Characterizations of pretameness and the Ord-cc, with Peter Holy and Regula Krapf
    Annals of Pure and Applied Logic 169, 8 (2018), 775-802
13. Measurable cardinals and good $\Sigma_1(\kappa)$-wellorderings, with Philipp Lücke
    Mathematical Logic Quarterly 64, 3 (2018), 207-217
14. Randomness via infinite computation and effective descriptive set theory, with Merlin Carl
    Journal of Symbolic Logic 83, 2 (2018), 766-789
15. Recognizable sets and Woodin cardinals: Computation beyond the constructible universe, with Merlin Carl and Philip Welch
    Annals of Pure and Applied Logic, Volume 169, 4 (2018), 312-332
16. Continuous reducibility and dimension of metric spaces
    Archive for Mathematical Logic 57, 3 (2018), 329-359
17. Perfect subsets of generalized Baire spaces and long games
    Journal of Symbolic Logic 82, 4 (2017), 1317-1355
18. Σ_1-definable subsets of $H(\omega_2)$, with Philipp Lücke and Ralf Schindler
    Journal of Symbolic Logic 82, 3 (2017), 1106-1131
19. Choiceless Ramsey theory for linear orders, with Philipp Lücke and Thilo Weinert
    Order 34, 3 (2017), 369-418
20. Pumping for ordinal-automatic structures, with Alexander Kartzow and Martin Huschenbett
    Computability 6, 2 (2017) 125-164
21. Infinite computations with random oracles, with Merlin Carl
    Notre Dame Journal of Formal Logic 58, 2 (2017), 249-270
22. Class forcing, the forcing theorem and Boolean completions, with Regula Krapf, Philipp Lücke and Ana Njegomir
    Journal of Symbolic Logic 81, 4 (2016), 1500-1530
23. Generalized Choquet spaces, with Samuel Coskey
    Fundamenta Mathematicae 232 (2016), 227-248
24. The Hurewicz dichotomy for generalized Baire spaces, with Philipp Lücke and Luca Motto Ros
    Israel Journal of Mathematics 216, 2 (2016), 973-1022
25. Tree-automatic scattered linear orders, with Sanjay Jain, Bakhadyr Khoussainov, and Frank Stephan
    Theoretical Computer Science 626 (2016), 83-96

26. Continuous images of closed sets in generalized Baire spaces, with Philipp Lücke
    Israel Journal of Mathematics 209, 1 (2015), 421-461
27. Wadge-like reducibilities in arbitrary quasi-Polish spaces, with Luca Motto Ros and Victor Selivanov
    Mathematical Structures in Computer Science 25, 8 (2015), 1705-1754
28. Lipschitz and uniformly continuous reducibilities on ultrametric Polish spaces, with Luca Motto Ros
    Ontos Verlag, 2014, 213-258
29. Thin equivalence relations and inner models
    Annals of Pure and Applied Logic 165, 10 (2014), 1577-1625
30. Automata on ordinals and automaticity of linear orders, with Frank Stephan
    Annals of Pure and Applied Logic 164, 5 (2013), 523-527
31. A minimal Prikry-type forcing for singularizing a measurable cardinal, with Karen Räsch and Peter Koepke
    Journal of Symbolic Logic 78, 1 (2013), 85-100
32. Tree representations via ordinal machines, with Benjamin Seyfferth
    Computablility 1, 1 (2012), 45-57
33. Non-isomorphism invariant Borel quantifiers, with Fredrik Engström
    Proceedings of the American Mathematical Society 139 (2011), 4487-4496
34. Thin equivalence relations in scaled pointclasses, with Ralf Schindler
    Mathematical Logic Quarterly 57, 6 (2011), 615-620

Articles in conference proceedings

1. Ordered Semiautomatic Rings with Applications to Geometry, with Ziyuan Gao, Sanjay Jain, Ji Qi, Frank Stephan and Jacob Tarr
   Language and Automata Theory and Applications (LATA) 2020
2. Automatic learning from repetitive texts, with Rupert Hölzl, Sanjay Jain, Karen Seidel and Frank Stephan
   Algorithmic Learning Theory (ALT) 2017
3. The recognizability strength of infinite time Turing machines with ordinal parameters, with Merlin Carl
   Computability in Europe (CiE) 2017
4. Structures without scattered-automatic presentation, with Alexander Kartzow
   Computability in Europe (CiE) 2013
5. The mate-in-n problem of infinite chess is decidable, with Dan Brumleve and Joel David Hamkins
   Computability in Europe (CiE) 2012
6. Automata on ordinals and linear orders, with Frank Stephan
   Computability in Europe (CiE) 2011

Submitted articles

1. Coarse groups, and the isomorphism problem for oligomorphic groups, with Andre Nies and Katrin Tent, 26 pages
   in revision for Journal of Mathematical Logic, recommended for publication by the referee
2. Decision times of infinite computations, with Philip Welch and Merlin Carl, 11 pages
   submitted to Notre Dame Journal of Formal Logic

Articles in preparation

1. The open dihypergraph dichotomy for definable subsets of generalised Baire spaces,
   with Dorottya Sziraki, 48 pages

2. The recognisable universe,
   with Philip Welch, 15 pages
3. Projective ranks of countable length,
   with Merlin Carl and Philip Welch, 20 pages
4. Generalized Polish spaces at uncountable regular cardinals,
   with Claudio Agostini and Luca Motto Ros, 43 pages
5. Ideal topologies on generalised Baire spaces,
   with Peter Holy, Marlene Koelbing and Wolfgang Wohofsky, 31 pages
6. Forcing and generic absoluteness without choice,
   with Daisuke Ikegami, 29 pages
7. Forcing axioms via ground model interpretations,
   with Christopher Turner, 31 pages
8. Internal absoluteness,
   with Sandra Müller, 15 pages

Co-edited books

1. Infinity, Computability, and Metamathematics, with Stefan Geschke and Benedikt Löwe
   College Publications 2014

Recent conference invitations (36 total)

1. First joint meeting of the Israeli Mathematical Union (IMU) and German Mathematical Society (DMV), Jerusalem, March 2021 (cancelled)
2. Arctic set theory workshop 5, Kilpisjärvi, February 2021 (postponed to 2022)
3. Automata Theory and Applications - Games, Learning and Structures, Singapore, September 2020 (postponed)
4. MAMLS spring fling, set theory conference, NYU, New York City, April 2020 (postponed)
5. Descriptive Set Theory and Computable Topology, Dagstuhl, April 2020 (postponed)
6. Forcing over Cohen's symmetric model, Special session in choiceless set theory and related areas, Joint Mathematics Meeting, Denver, January 2020
7. Internal absoluteness, 15th Atelier International de Theorie des Ensembles, CIRM Luminy, September 2019
8. Ideal topologies on generalized Cantor spaces, Workshop on Set Theory of the Reals, Oaxaca CMO-BIRS, August 2019
9. Randomness notions for infinite time Turing machines, Workshop on Recursion Theory, Set Theory and Interactions, Institute for Mathematical Sciences (IMS), NUS Singapore, May-June 2019

Recent seminar invitations (35 total)

1. The recognisable universe in the presence of measurable cardinals, New York Set Theory Seminar, CUNY, November 2020
2. Structural results about Π^1_1 and Σ^1_2 sets, Logic Seminar, National University of Singapore, November 2020
3. Tree forcings, sharps and absoluteness, Kurt Gödel Research Center Research Seminar, University of Vienna, November 2020
4. Borel sets in effective descriptive set theory, Ghent-Leeds Virtual Logic Seminar, September 2020
5. Infinite time computation and ranks in descriptive set theory, Seminaire de LACL, Creteil University, February 2020 (cancelled due to university closures)

6. The lengths of countable ranks, Logic and set theory seminar, University of Bristol, February 2020
7. Internal absoluteness, Set theory seminar, Université de Paris, December 2019
8. Oligomorphic groups are essentially countable, Logic seminar, Université de Paris, December 2019
9. An introduction to automatic structures, Logic seminar, Swansea University, April 2019

Administration

- Organisation of various research seminars
- Co-organisation of 8 international conferences
- Management of Marie Curie grant
- Webmaster of the European Set Theory Society (ESTS): ests.wordpress.com

Conference organisation

- Set Theory in the UK 6, 2020, online, financed by the London Mathematical Society
- Fifth Workshop on Generalised Baire Spaces 2020, Bristol, financed by the London Mathematical Society
- Set Theory in the UK 2 2019, Bristol, financed by the London Mathematical Society
- Mini-Workshop on Computability and its Relation to Set Theory 2018, Auckland
- Set Theory Workshop on Generalized Baire spaces 2016, Bonn
- 9th Young Set Theory Workshop 2016, Copenhagen (program committee)
- Infinity, Computability and Metamathematics 2014, Bonn
- Infty Final Conference 2014, Bonn
- 5th Young Set Theory Workshop 2012, Luminy (program committee)
- 4th Young Set Theory Workshop 2011, Königswinter

Public engagement

- Mathematics experiments at *FUTURES: European Researchers Days*, Bristol, 2018 and 2019
- Co-organisation of mathematics experiments, Cheltenham Science Festival 2019
- General audience talk: Large infinities in mathematics, Basic notions seminar, Bonn 2017

Other professional activities

- Referee for the journals:

  Advances in Mathematics, Annals of Pure and Applied Logic, Archive for Mathematical Logic, Computability, Contemporary Mathematics, Journal of the American Mathematical Society (co-referee), Journal of Mathematical Logic, Journal of Symbolic Logic, Logical Methods in Computer Science, Mathematical Logic Quarterly, Memoirs of the American Mathematical Society; Other journals, conferences and book publications.
- Member of the Association for Symbolic Logic, European Set Theory Society, London Mathematical Society, British Logic Colloquium

Grants

- Successful grant application, jointly with Prof. Philip Welch, for EPSRC postdoc grant for 2.5 years, to start in September 2021 at the University of Bristol

- Horizon 2020 Marie Sklodowska-Curie Individual Fellowship (MSCA) "Inner models and Infinite Computations" (IMIC), 2018-2020: 126.000 Euros
- Visiting fellowship for the program "Large cardinals and strong logics", CRM Bellaterra, Barcelona, November 2016
- Visiting fellowship for the program "Mathematical, Foundational and Computational Aspects of the Higher Infinite", Isaac Newton Institute Cambridge, October-December 2015
- Participation in the grant "Complexity and Definability at Higher Cardinals – Studies in Generalized Descriptive Set Theory" of the German Research Foundation (DFG) in 2015-2017 with Philipp Lücke, Peter Holy and Peter Koepke, Bonn
- Short visit grant to visit Prof. Mati Rubin in Beersheba, Israel, February-March 2015
- Several short visit grants in the program "New Frontiers of Infinity" of the European Science Foundation (ESF) 2009 Stockholm, 2010 Torino, 2014 Torino
- Fellowship of the German Academic Exchange Service (DAAD) and funding from Prof. Itay Neeman's NSF grant 2005-2006, UCLA, Los Angeles

Prizes

- Prize for best doctoral theses (biennial) of the German association for mathematical logic and foundations (DVMLG), Ph.D. Colloquium Darmstadt 2009