

Raffael Stenzel

Curriculum Vitae

Max Planck Institute for Mathematics
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Primary research interests

Homotopical algebra, category theory and mathematical logic

Employment

- 2023 - 2024 **Postdoctoral Fellow**, *Max Planck Institute for Mathematics*, Bonn, Germany
2019 - 2023 **Postdoctoral Researcher**, *Masaryk University*, Brno, Czech Republic

Education

- 2015 - 2019 **Ph.D. in Pure Mathematics**, *Funded by a 110 Anniversary Scholarship Faculty Award*, University of Leeds, UK
Thesis: "On univalence, Rezk completeness and presentable quasi-categories"
Supervisor: Prof. Nicola Gambino
Examiners: Dr. Simona Paoli, Dr. Andrew Brooke-Taylor and Prof. Paul Martin
- 2014 **M. Sc. Degree**, *University of Bonn, Germany*, Mathematics, Grade: 1,0
Master's thesis: "Intensional Type Theory – On its Metatheory and Sets in Homotopy Type Theory" supervised by Prof. Peter Koepke and Prof. Jens Franke
- 2012 **B. Sc. Degree**, *University of Bonn, Germany*, Mathematics with secondary subject Physics
Bachelor's thesis: "Set Theoretic Geology" supervised by Prof. Stefan Geschke

List of publications and preprints

- 2024 **Lurie's Unstraightening as a weak biequivalence of ∞ -cosmoi**, *Preprint*, arxiv:2403.01167
- 2024 **The $(\infty, 2)$ -category of internal $(\infty, 1)$ -categories**, *Preprint (Submitted)*, arxiv:2402.01396
- 2023 **Notions of $(\infty, 1)$ -sites and related formal structures**, *Preprint*, arxiv:2306.06619
- 2023 **On notions of compactness, object classifiers and weak Tarski universes**, *Mathematical Structures in Computer Science, Volume 33, Special Issue 8: Homotopy Type Theory 2019*
DOI: <https://doi.org/10.1017/S0960129523000051>
- 2023 **Univalence and completeness of Segal objects**, *Journal of Pure and Applied Algebra*, Volume 227 (2023), Issue 4
DOI: <https://doi.org/10.1016/j.jpaa.2022.107254>
- 2022 **Higher geometric sheaf theories**, *Preprint (Submitted)*, arXiv:2205.08646

- 2022 **Bousfield-Segal spaces**, *Homology, Homotopy and Applications*, Volume 24 (2022), No. 1, p.217-243.
DOI: <https://dx.doi.org/10.4310/HHA.2022.v24.n1.a12>
- 2020 **$(\infty, 1)$ -Categorical comprehension schemes**, *Preprint (Submitted)*, arXiv:2010.09663

Invited talks at research seminars and colloquia

- Mar 2024 **Abstract Homotopy Theory Seminar**, *Max Planck Institute for Mathematics, Bonn, Germany*
Title: Higher internal category theory
- Dec 2023 **Category Theory Seminar**, *Johns Hopkins University, Baltimore MD*
Title: The $(\infty, 2)$ -category of internal $(\infty, 1)$ -categories
- Dec 2023 **Homotopy Type Theory Seminar**, *Carnegie Mellon University, Pittsburgh PA*
Title: General and diagrammatic comprehension schemes over ∞ -categories
- Nov 2023 **ItaCa Fest 2023**, *Online Webinar of the Italian Category Theory Community*
Title: The Comparison Lemma in higher topos theory
- Nov 2023 **Category Theory Seminar**, *University of Manchester, UK*
Title: The $(\infty, 2)$ -category theory of internal $(\infty, 1)$ -categories
- Nov 2023 **Topologie Oberseminar**, *Ruhr Universität Bochum, Bochum, Germany*
Title: Higher categorical internalization in simplicial homotopy theory
- July 2023 **MPI-Oberseminar**, *Max Planck Institute for Mathematics, Bonn, Germany*
Title: Higher geometric sheaf theories
- Mar 2022 **Topology Seminar**, *EPFL, Lausanne, Switzerland*
Title: Structured geometric sheaves in higher category theory
- Nov 2021 **HoTTEST Series**, *Online (via the University of Western Ontario, Canada)*
Title: Higher sites and their higher categorical logic
- Dec 2019 **Algebra and Geometry Seminar**, *Brno University of Technology, Brno, Czech Republic*
Title: Homotopy Type Theory - What functional programming and homotopy theory have in common
- Dec 2017 **Yorkshire and Midlands Category Theory Seminar**, *University of Birmingham, UK*
Title: Complete Bousfield-Segal spaces as a model for Homotopy Type Theory
- Oct 2016 **Proofs and Constructivism Seminar**, *University of Leeds, UK*
Title: A bisimplicial model for $(\infty, 1)$ -groupoids

Talks at conferences

- July 2024 **TACL 2024**, *Universitat de Barcelona & The Artificial Intelligence Research Institute (CSIC), Barcelona, Spain*
Title: The $(\infty, 2)$ -category of internal $(\infty, 1)$ -categories
- May 2023 **Workshop on Doctrines & Fibrations**, *Università di Padova, Italy*
Title: The $(\infty, 2)$ -categorical externalization functor

- May 2022 **COST EuroProofNet WG6 kick-off meeting: Syntax and Semantics of Type Theories**, *University of Stockholm, Sweden*
Title: Higher geometric sheaf theories
- Sep 2021 **Category Theory 2020→21**, *Genoa, Italy*
Title: $(\infty, 1)$ -Categorical comprehension schemes
- July 2021 **Logic Colloquium 2021**, *Poznań, Poland (Online)*
Title: $(\infty, 1)$ -Categorical comprehension schemes
- July 2021 **HoTT/UF Workshop, FSCD 2021**, *Buenos Aires, Argentina (Online)*
Title: $(\infty, 1)$ -Categorical comprehension schemes
- Aug 2019 **International Conference on Homotopy Type Theory (HoTT 2019)**, *Carnegie Mellon University, Pittsburgh USA*
Title: Univalence and completeness of Segal objects
- July 2019 **Category Theory 2019**, *University of Edinburgh, Scotland*
Title: Univalence and completeness of Segal objects
- Mar 2018 **103rd Peripatetic Seminar on Sheaves and Logic**, *Masaryk University, Brno, Czech Republic*
Title: Complete Bousfield-Segal spaces as a model for Homotopy Type Theory
- Mar 2017 **MURI Meeting on HoTT**, *Carnegie Mellon University, Pittsburgh USA*
Title: On complete Bousfield-Segal spaces and Univalence

Miscellaneous

Peer reviewed articles for the following journals

Mathematical Structures in Computer Science (Cambridge University Press, UK), Algebraic & Geometric Topology (Mathematical Sciences Publishers, USA), Transactions of the American Mathematical Society (AMS, USA), Applied Categorical Structures (Springer, Netherlands), Higher Structures (Czech Academy of Sciences), Theory and Applications of Categories (Mount Allison University, Canada)

- Since Feb 2023 **Reviewer for MathSciNet (Mathematical Reviews Online)**, Edited by the American Mathematical Society
- Since July 2022 **Reviewer for zbMATH Open (formerly known as Zentralblatt MATH)**, Edited by the European Mathematical Society, the Heidelberg Academy of Sciences and Humanities and FIZ Karlsruhe
- May 2022 **Part of the Organising Committee**, *106th Peripatetic Seminar on Sheaves and Logic*, Masaryk University, Brno, CZ
- June 2019 **Part of the Organising Committee**, *Summer School on Higher Topos Theory and Univalent Foundations*, University of Leeds, UK
- Apr 2019 **Right Properness of Left Bousfield Localizations**, *Guest Post on the n-Category Café*, Uploaded on April 29th 2019 by Mike Shulman

Teaching

- Feb - May 2022 **Postgrad lecture course**, *"Categorical models of type theory"*, Masaryk University, Brno, CZ
- July 2019 **Tutor**, *LMS Undergraduate Summer School*, University of Leeds, UK

2015 to 2019 **Tutorials at University of Leeds**

History of Mathematics - held by Dr. Richard Elwes, Prof. Alexander Veretennikov and Dr. Phil Walker

Sets, Sequences and Series (1st Year Course) - held by Prof. Alexander Strohmaier

Mathematical Logic I (2nd Year Course) - held by Dr. Andrew Brooke-Taylor

Introduction to Geometry (2nd Year Course) - held by Prof. Marsh

Number Systems (1st Year Course) - held by Dr. Houston and Dr. Messmer

Rings, Fields and Polynomials (2nd Year Course) - held by Prof. Marsh

Groups and Vector Spaces (2nd Year Course) - held by Prof. Truss

Number Systems (1st Year Course) - held by Dr. Houston and Dr. Messmer

2012 to 2015 **Tutorials at University of Bonn**

Set Theory - held by Dr. Lücke

Mathematical Logic - held by Prof. Koepke

Models of Set Theory II (Master's course) - held by Prof. Koepke

Models of Set Theory I (Master's course) - held by Prof. Koepke

Mathematics for Physicists I - held by Dr. Räsch

Elements of Mathematics II (for student teachers) - held by Prof. Koch

Summer schools, workshops and other extracurricular education

Dec 2023 **Research Visit**, *Johns Hopkins University, Baltimore, MD*, Discussions with Prof. Emily Riehl and her research group

Nov 2023 **Research Visit**, *Carnegie Mellon University, Pittsburgh, PA*, Discussions with Prof. Steve Awodey and his research group

Nov 2023 **Research Visit**, *University of Manchester, UK*, Discussions with Dr. Nicola Gambino and his research group

June 2023 **Arbeitstagung 2023 on Condensed Mathematics**, *Max Planck Institute for Mathematics, Germany*, Organized by Prof. Dustin Clausen and Prof. Peter Scholze

April 2023 **COST EuroProofNet WG6 meeting on Syntax and Semantics of Type Theories**, *TU Wien, Austria*

Sep 2022 **Chaire de la Vallée Poussin Lectures and Workshop on Categories and Topology**, *Université catholique de Louvain, Louvain-la-Neuve, Belgium*, Short lecture series held by Prof. Ieke Moerdijk (University of Utrecht) with additional Colloquium and Workshop

Feb 2021 **CRM Intensive Research Program: Higher Homotopical Structures Opening Workshop**, *Centre de Recerca Matemàtica, Barcelona, Spain (Online)*

Aug 2019 **HoTT Summer School**, *Carnegie Mellon University, Pittsburgh USA*

June 2019 **Summer School on Higher Topos Theory and Univalent Foundations**, *University of Leeds, UK*

June 2018 **Research Visit**, *University of Regensburg, Germany*, Discussions with Prof. Denis-Charles Cisinski

May/June 2018 **MIT Talbot Workshop**, *Government Camp OR, USA*, Workshop on the theory of ∞ -cosmoi mentored by Prof. Emily Riehl (Johns Hopkins University) and Prof. Dominic Verity (Macquarie University)

Sep 2017 **Univalent Foundations Workshop**, *University of Oxford, UK*

Jan 2016 **Short course on definable groups**, *University of Leeds, UK*, held by Prof. Alessandro Berarducci (University of Pisa)

2013-2014 **GRK 1150 Lecture Series on Higher Category Theory and Higher K-Theory**, *University of Bonn, Germany*, held by Prof. Peter Scholze

Languages

German **First native language**

English **Fluent**

Romanian **Second native language (intermediate)**

French **Basic**