

Curriculum Vitae

Name	Oliver Lorscheid
Born	February, 8th, 1978 in Cologne (Germany)
Nationality	German
Family status	Partnership with two kids (born in 2011 and 2013)
Institute	Instituto Nacional de Matemática Pura e Aplicada (IMPA)
Address	Estrada Dona Castorina 110, Rio de Janeiro 22460-320, Brazil
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Research Interests

Algebraic curves: moduli spaces of vector bundles on curves; elliptic curves;

Algebraic groups: Chevalley groups; buildings;

Combinatorics: graphs; matroids;

Generalized scheme theory: \mathbb{F}_1 -geometry; tropical geometry; non-archimedean analytic geometry;

K-theory: connections of \mathbb{F}_1 -geometry to stable homotopy theory and arithmetic;

Number theory: L -series and zeta functions; periods of automorphic forms;

Representation theory: quiver Grassmannians.

Employment history

Dec 2018–Feb 2020 since June 2014	Sabbatical at the Max Planck Institute for Mathematik (MPIM) in Bonn Professor at IMPA in Rio de Janeiro (tenured since 2018)
Apr 2012–May 2014	Postdoc at IMPA in Rio de Janeiro
Oct 2010–Sep 2011	Postdoc at the City University of New York (CUNY), funded by the Humboldt foundation
Apr 2010–Sep 2010	Substitute professor at the University of Frankfurt
Jan 2010–Mar 2010	Postdoc at the Hausdorff Institute for Mathematics (HIM) in Bonn
Oct 2009–Mar 2012	Postdoc at the University of Wuppertal (suspended from Jan 2010 till Sept 2011)
Sep 2008–Aug 2009	Postdoc at the MPIM in Bonn
Jun 2004–May 2008	Graduate student and teaching assistant at Utrecht University,
Oct 2000–Sep 2003	Teaching assistant at the University of Bonn
Sep 1997–Sep 1998	Civil Service

Education

- 2008 PhD in Mathematics at Utrecht University;
thesis: “Toroidal Automorphic Forms for Function Fields”;
advisor: Gunther Cornelissen
- 2004 Master in Mathematics (Diplom) at the University of Bonn;
master thesis: “Completeness and compactness for varieties over a local field”;
advisor: Florian Pop
- 2001 Undergraduate degree in Physics (Vordiplom) at the University of Bonn
- 2000 Undergraduate degree in Mathematics (Vordiplom) at the University of Bonn
- 1997 High school degree (Abitur)

Grants and stipends

- 2019 Stipend for 12 months at the MPI in Bonn
- 2018 Grants from CAPES, Compositio, ICTP and NSF for the workshop
Tropical Geometry and Moduli Spaces in Cabo Frio (joint with Nicaise, Melo and Payne)
- 2018 Productivity Grant from CNPq
- 2018 Stipend for two month at the MPIM/HIM in Bonn
- 2016 Emergente from FAPERJ
(joint with Cotterill, Hassanzadeh, Heluani, Massarenti, Pacini, Salgado)
- 2016 Jovem Cientista from FAPERJ
- 2015 Grants from CNPq, FAPERJ and CAPES for the workshop Rational Points at IMPA
(joint with Auer, Salgado, Varilly-Alvarado)
- 2015 Grants from CNPq, FAPERJ and CAPES for the workshop Tropical Geometry in the Tropics at IMPA
(joint with Cotterill, Dickenstein and Puignau)
- 2015 Productivity Grant from CNPq
- 2014 Universal A from CNPq
- 2014 Stipend for one month at the MPIM in Bonn
- 2013 Stipend for two months at the HIM in Bonn
- 2012 Postdoc for three years at IMPA in Rio de Janeiro
- 2011 Stipend for one month at IMPA in Rio de Janeiro
- 2010 Feodor Lynen Stipend from the Humboldt foundation for one year at CUNY in New York
- 2010 Stipend for four months at the HIM in Bonn
- 2008 Stipend for one year at the MPIM in Bonn

Research programmes and research visits

- Dec 2018–Feb 2020 Sabbatical at the Max Planck Institute for Mathematik (MPIM) in Bonn
- Jan–Feb 2018 Programme Periods in Number Theory, Algebraic Geometry and Physics at the HIM
- Nov 2016 Visit to Matt Baker in Atlanta
- Jan–Feb 2016 Visit to Jan Schröer in Bonn
- June 2014 Research stay at the MPIM in Bonn
- Jan 2013 Programme Arithmetic and Geometry at the HIM in Bonn
- Jan 2011 Research stay at IMPA in Rio de Janeiro
- July 2010 Research stay at the MFO with Shabnam Akhtari, funded by a Leibniz fellowship
- Jan–Mar 2010 Programme Algebra and Number Theory at the HIM in Bonn
- June 2007 Research stay at Paris 11, funded by a Van Gogh fellowship

Conferences and Seminars

- 2018 Problem Solving in Group Theory (Florence)
Geometry in Algebra and Algebra in Geometry 4 (São Paulo)
Tropical Geometry and Moduli Spaces (Cabo Frio)
Periods and Regulators (HIM Bonn)
- 2017 Geometry at the Frontier II (Pucón)
Arithmetic of Function Fields (Münster)
Foundation of tropical schemes (San Jose)
Quiver Grassmannians and their applications (Wuppertal)
Commutative Algebra and Algebraic Geometry (Rio de Janeiro)
- 2016 Algebraic, Tropical, and Nonarchimedean Analytic Geometry of Moduli Spaces (Oaxaca)
Brazilian Algebra School (Diamantina)
- 2015 30 Colóquio Brasileiro de Matemática (IMPA)
International Conference in Number Theory and Physics (IMPA)
II ELGA - Latin American School of Algebraic Geometry (Cabo Frio)
Rational Points (IMPA)
Workshop on Higher Dimensional Algebraic Geometry (IMPA)
Tropical Geometry in the Tropics (IMPA)
Moduli Spaces and Enumerative Geometry (IMPA)
- 2014 Non-commutative Geometry and Number Theory (HIM)
Algebraic Foundations of Tropical Geometry (YALE)
- 2013 Álgebra Comutativa e Geometria Algébrica (Teresopolis)
- 2012 Jornadas de Geometria Algébrica (Niteroi)
Álgebra Comutativa e Geometria Algébrica (Rio de Janeiro)
6th European Congress of Mathematics (Kraków)
Witt Vectors in Arithmetic, Geometry, and Topology (Albuquerque)
Noncommutative Geometry: Multiple Connections (Columbus)
Incidence Geometry and Buildings (Ghent)
- 2011 Lie Algebras, Algebraic Transformation Groups and Representation Theory (Las Vegas)
Noncommutative Geometry and Arithmetic (Baltimore)
Arithmetic of Modular Forms and Elliptic Curves (Rio de Janeiro)
- 2010 Noncommutative Geometry and Applications to Number Theory (Columbus)
Arithmetic Aspects of Elliptic Surfaces (Bonn)
- 2009 Focused Workshop on \mathbb{F}_1 -geometry (Granada)
Frobenius Lifts (Leiden)
Analytic Theory of Automorphic Forms (Woudschoten)
Mathematische Arbeitstagung (Bonn)
Noncommutative Geometry and Operator Algebras (Nashville)
- 2008 Rapoport's 60th birthday conference (Bonn)
Summer School on p-adic Cohomology (Mainz)
Summer School on Affine Buildings (Münster)
- 2007 Arithmetically Defined Hyperbolic Manifolds (Oberwolfach)
Galois Theory and Explicit Methods (Leiden)
Classical and Modular Approaches to Exponential Diophantine Equations (Bonn)
- 2006 Rings of Low Rank (Leiden)
Abelian Varieties (Amsterdam)
Spring school on Abelian Varieties (Utrecht)
20th Annual Workshop on Automorphic Forms and Related Topics (Boulder)

- 2005 Arithmetic Geometry and Automorphic Forms (Tianjin)
 Summer school on Arithmetic Geometry and Automorphic Forms (Beijing)
 Géométrie Algébrique en Liberté XIII (Luminy)
 Yuri Manin's Emeritierung Conference (Bonn)
- 2004 Automorphisms of Curves (Leiden)
 Spring school on Lie Groups in Analysis, Geometry and Mechanics (Utrecht)

Mini courses

- Feb 2016 Scheme theoretic tropicalization (Rome)
 Feb 2016 Scheme theoretic tropicalization (Bonn)
 Mar 2015 Introduction to tropical geometry (IMPA)
 May 2014 On the geometry of blueprints and applications to tropical schemes (YALE)
 Jan 2014 Lectures on \mathbb{F}_1 (IMPA)

Research talks

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| 2018 Seminar of Algebra and Number Theory (Saarbrücken) | [1.5] ¹ |
| Obersiminar Algebra und Geometrie (Münster) | [3.1] |
| Number Theory Lunch Seminar (MPI Bonn) | [2.3] |
| Colloquium (Regensburg) | [1.5] |
| 2017 BIREP Seminar (Bielefeld) | [3.1] |
| Arithmetic of Function Fields (Münster) | [2.3] |
| Foundations of tropical schemes (AIM workshop, San Jose) | [1.5] |
| Commutative Algebra and Algebraic Geometry (IMPA) | [1.6] |
| 2016 Algebra Seminar (Atlanta) | [1.5] |
| Algebra and Geometry Seminar (Roma 1) | [3.1] |
| Algebraic Geometry Seminar (Warwick) | [1.5] |
| SFB-Seminar (Regensburg) | [1.5] |
| Oberseminar Algebra (Wuppertal) | [3.1] |
| 2015 30 Colóquio Brasileiro de Matemática (IMPA) | [1.5] |
| 2014 Noncommutative Geometry and Number Theorie (HIM) | [1.5] |
| Oberseminar Algebra und Zahlentheorie (Wuppertal) | [3.1] |
| Seminar Algebraic Geometry (Utrecht) | [1.5] |
| 2013 Álgebra Comutativa e Geometria Algébrica (Teresopolis) | [1.4] |
| Köln-Bonn Algebra Seminar (Cologne) | [2.3] |
| Seminar in Representation Theory (Bonn) | [3.1] |
| Colloquium of the Hausdorff Institute (Bonn) | [1.1] |

¹The numbers in the right column indicate the topic of the talk: 1.1 Blueprints. 1.2 Algebraic groups over \mathbb{F}_1 . 1.3 K -theory of \mathbb{F}_1 -schemes. 1.4 Comparison of \mathbb{F}_1 -theories. 1.5 Tropical scheme theory. 1.6 Matroid bundles. 2.1 Toroidal automorphic forms. 2.2 Non-vanishing L -series in quadratic twists. 2.3 Graphs of Hecke operators. 3.1 Quiver Grassmannians. 4.1 Completeness and compactness of varieties over a local field.

2012	Seminar on Mathematics and String Theory at IPMU (Tokyo)	[1.2]
	Geometry Seminar of UNICAMP (Campinas)	[3.1]
	Algebra Seminar of UFRJ (Rio de Janeiro)	[3.1]
	Jornadas de Geometria Algébrica (Niteroi)	[1.1]
	6th European Congress of Mathematics (Kraków)	[1.1]
	Witt Vectors in Arithmetic, Geometry and Topology (Albuquerque)	[1.1]
	Noncommutative Geometry: Multiple Connections (Columbus)	[1.2]
	Algebra seminar of IMPA (Rio de Janeiro)	[1.1]
	Seminar on Algebra, Geometry and Physics MPIM (Bonn)	[1.1]
	Algebra and Number Theory Seminar (Utrecht)	[1.1]
	Incidence Geometry and Buildings (Ghent)	[1.2]
2011	Algebra Seminar of IMPA (Rio de Janeiro)	[2.3]
	Lie Algebras, Algebraic Transformation Groups and Representation Theory (Las Vegas)	[1.2]
	Algebra Seminar of UPenn (Philadelphia)	[1.1]
	Noncommutative Geometry and Arithmetic (Baltimore)	[1.3]
	CUNY Impromptu Seminar (New York)	[1.1]
	Arithmetic of Modular Forms and Elliptic Curves (Rio de Janeiro)	[2.1]
2010	BU Geometry seminar (Boston)	[1.3]
	Collaborative Number Theory Seminar (New York)	[2.2]
	Algebra seminar of IMPA (Rio de Janeiro)	[1.2]
	Noncommutative Geometry and Arithmetics (Columbus)	[1.3]
	Algebraic Geometry and Number Theory Seminar (Baltimore)	[1.2]
	Intercity seminar (Utrecht)	[1.2]
	Colloquium of HIM (Bonn)	[2.3]
2009	Focused Workshop on \mathbb{F}_1 -geometry (Granada)	[1.4]
	Intercity Number Theory Seminar (Nijmegen)	[2.2]
	Mathematische Arbeitstagung (Bonn)	[1.2]
	Seminar on Algebra, Geometry and Physics MPIM (Bonn)	[1.2]
	Noncommutative Geometry and Operator Algebra (Nashville)	[1.4]
	Oberseminar MPIM (Bonn)	[2.1]
	Graduiertenkolleg (Wuppertal)	[1.4]
	Joint Seminar K.U.Leuven-UGent (Gent)	[2.1]
2008	Graduiertenkolleg (Göttingen)	[2.3]
	Geometry Seminar (Leiden)	[2.3]
	Mathematical Colloquium (Utrecht)	[2.1]
	Séminaire Groupes Réductifs et Formes Automorphes (Paris)	[2.1]
2007	Number Theory Lunch Seminar MPIM (Bonn)	[2.1]
2006	Intercity Number Theory Seminar (Utrecht)	[2.1]
	Lecture series (10 lectures) on my PhD project (Utrecht)	[2.1, 2.3]
2005	Intercity Number Theory Seminar (Nijmegen)	[4.1]
2004	Algebra and Number Theory Seminar (Utrecht)	[4.1]

Organization of scientific activities

- 2018 Tropical geometry and moduli spaces (Cabo Frio, upcoming)
Satellite conference of the ICM 2018 in Rio de Janeiro
(joint with Johannes Nicaise, Margarida Melo and Sam Payne)
- 2017 Algebraic Geometry Session of the Brazilian Colloquium (Rio de Janeiro)
(joint with Marco Pacini and Cecília Salgado)
- 2017 Workshop on Quiver Grassmannians (Wuppertal)
(joint with Markus Reineke and Thorsten Weist)
- 2016 Number Theory Session at the Brazilian Algebra School (Diamantina)
(joint with André Bueno and Hemar Godinho)
- 2015 Study group on tropical moduli spaces (IMPA)
(joint with Ethan Cotterill and Marco Pacini)
- 2015 Workshop Rational Points (IMPA)
(joint with Asher Auel, Cecília Salgado and Antony Várilly-Alvarado)
- 2015 Workshop Tropical Geometry in the Tropics (IMPA)
(joint with Ethan Cotterill, Alicia Dickenstein and Nicolas Puignau)
- 2014+ Algebra Seminar of IMPA (Rio de Janeiro)
(ongoing weekly seminar, joint with C. Araújo, E. Esteves and R. Heluani)
- 2012+ Colóquio de Geometria e Aritmética (Rio de Janeiro)
(ongoing monthly seminar, joint with C. Araújo, E. Esteves, N. Medeiros and C. Salgado)
- 2010 Mini talks at CUNY (New York)
- 2007 Kleine Arbeitsgemeinschaft “Simultaneous resolution of singularities” (Bonn),
(joint with Christian Liedtke)

Students

Alexander Argudelo Velez	PhD (expected graduation in 2020)
Valdir José Pereira Júnior	PhD (expected graduation in 2020)
Emílio Peixoto Assemany	PhD (expected graduation in 2019)
Roberto Alvarengo Jr.	PhD (2018)
Mitul Verma	Master (expected graduation in 2019)
Luis Henrique Nasi Ravettino	Master (2018)
Eduardo dos Santos Silva	Master (2017)
João Paulo Lindquist Figueredo	Master (2017)
Esteban Jose Arreaga Ambeliz	Master (2017)
Valdir José Pereira Júnior	Master (2016)

Teaching

- 2018 Blueprints and Tropical Scheme Theory
Algebra 2
- 2017 Algebra 1
Algebraic Number Theory
Seminar on Geometric Invariant Theory
Seminar on Tropical Scheme Theory
- 2016 Tropical Geometry and Berkovich Spaces
Algebra 1
Seminar on the Langland's Programme
Seminar on Elliptic Curves
- 2015 Algebra 2
Algebraic Number Theory
Seminar on Topos Theory
Seminar on Class Field Theory
Seminar on Toric Varieties
Seminar on Moduli Spaces of Tropical Curves
- 2014 Algebra 2
Seminar on Classical Topics in Algebraic Geometry
Seminar on Moduli Spaces of Vector Bundles
- 2013 Algebraic Geometry 1
Seminar on Arakelov Geometry
- 2010 Calculus (Frankfurt)
Linear Algebra (Frankfurt)
Seminar on Ramanujan Graphs (HIM)
- 2009 Seminar on Tilting Theory (Wuppertal)
- 2005 Seminar on Class Field Theory (Utrecht)

All courses from 2013 on took place at IMPA. Before I started lecturing, I have organized and taught exercises classes for more than eight years in total.

Honors

Alumni of the Humboldt foundation

Editorial activities

Editor of Innovations in Incidence Geometry (since 2017)

Languages

German (mother tongue)
English (fluent)
Portuguese (good)
Dutch (good)
French (basic reading skills)

List of publications

- [1] *Completeness and compactness for varieties over a local field*. Arch. Math. 88 (4), 344–348, 2007.
- [2] *On the K -theory of graph C^* -algebras* (with Gunther Cornelissen and Matilde Marcolli). Acta Appl. Math. 102 (1), 57–69, 2008.
- [3] *Toroidal automorphic forms for some function fields* (with Gunther Cornelissen). J. Number Theory 129 (6), 1456–1463, 2009.
- [4] *Functional equations for zeta functions of \mathbb{F}_1 -schemes*. C. R. Acad. Sci. Paris, Ser. I 348, 1143–1146, 2010.
- [5] *Torified varieties and their geometries over \mathbb{F}_1* (with Javier López Peña). Math. Z. 267, no. 3-4, 605–643, 2011.
- [6] *Mapping \mathbb{F}_1 -land: An overview of geometries over the field with one element* (with Javier López Peña). Noncommutative geometry, arithmetic, and related topics, 241–265, Johns Hopkins Univ. Press, Baltimore, MD, 2011.
- [7] *Algebraic groups over the field with one element*. Math. Z. 271, no. 1-2, 117–138, 2012.
- [8] *Toroidal automorphic forms, Waldspurger periods and double Dirichlet series* (with Gunther Cornelissen). Multiple Dirichlet series, L-functions and automorphic forms, 131–146, Progr. Math., 300, Birkhäuser/Springer, New York, 2012.
- [9] *The geometry of blueprints. Part I*. Adv. Math. 229, no. 3, 1804–1846, 2012.
- [10] *Sheaves and K -theory for \mathbb{F}_1 -schemes* (with Chenghao Chu and Rekha Santhanam). Adv. Math. 229, no. 4, 2239–2286, 2012.
- [11] *Automorphic forms for elliptic function fields*. Math. Z. 272, no. 3-4, 885–911, 2012.
- [12] *Projective Geometry for blueprints* (with Javier López Peña). C. R. Math. Acad. Sci. Paris 350, no. 9-10, 455–458, 2012.
- [13] *Graphs of Hecke operators*. Algebra Number Theory 7, no. 1, 19–61, 2013.
- [14] *Toroidal automorphic forms for function fields*. Israel J. Math. 194, no. 2, 555–596, 2013.
- [15] *On Schubert decompositions of quiver Grassmannians*. J. Geom. Phys. 76, 169–191, 2014.
- [16] *Blueprints—towards absolute arithmetic?* J. Number Theory 144, 408–421, 2014.
- [17] *Schubert decompositions of quiver Grassmannians for tree modules*. Algebra Number Theory 9(6), 1337–1362, 2015.
- [18] *A remark on adelic topologies* (with Cecília Salgado). J. Number Theory 159, 193–201, 2016.
- [19] *A blueprinted view on \mathbb{F}_1 -geometry*. In *Absolute arithmetic and \mathbb{F}_1 -geometry* (edited by Koen Thas). European Mathematical Society Publishing House, 2016.
- [20] *Blue schemes, semiring schemes and relative schemes after Toën and Vaquié*. J. Algebra 482:264–302, 2017.
- [21] *Cech cohomology over \mathbb{F}_{1^2}* (with Jaret Flores and Matt Szczesny). J. Algebra 485:269–287, 2017.

- [22] *On the relation between hyperrings and fuzzy rings* (with Jeffrey Giansiracusa and Jaiung Jun). *Beitr. Algebra Geom.* 58(4):735–764, 2017.
- [23] *Quasicoherent sheaves on projective schemes over \mathbb{F}_1* (with Matt Szczesny). *J. Pure Appl. Algebra* 222(6):1337–1354, 2018.
- [24] \mathbb{F}_1 *for everyone*. *Jahresber. Dtsch. Math.-Ver.* 120(2), 83-116, 2018.
- [25] *Plücker relations for quiver Grassmannians* (with Thorsten Weist). *Algebras and Representations theory* (online first, 2018). DOI 10.1007/s10468-017-9762-4.
- [26] *The geometry of blueprints. Part II*. *Forum Math. Sigma* 6, e20, 90pp., 2018.
- [27] *Quiver Grassmannians of type \tilde{D}_n , Part 1: Schubert systems and decompositions into affine spaces* (with Thorsten Weist). To appear in *Memoirs of the AMS*, 73pp.

Preprints

- [28] *Quiver Grassmannians of type \tilde{D}_n , Part 2: Schubert decompositions and F -polynomials* (with Thorsten Weist). Preprint, [arXiv:1507.00395](https://arxiv.org/abs/1507.00395), 53pp.
- [29] *Scheme theoretic tropicalization*. Preprint, [arXiv:1508.07949](https://arxiv.org/abs/1508.07949), 66pp.
- [30] *Representation type via Euler characteristics and singularities of quiver Grassmannians* (with Thorsten Weist). Preprint, [arXiv:1706.00860](https://arxiv.org/abs/1706.00860), 17pp.
- [31] *Moduli spaces of matroids* (with Matthew Baker). Preprint, [arXiv:1809.03542](https://arxiv.org/abs/1809.03542), 83pp.
- [32] *Newton polygons, Descartes' rule of signs, and polynomials over hyperfields* (with Matthew Baker). Preprint, [arXiv:1811.04966](https://arxiv.org/abs/1811.04966), 16pp.

Thesis, lecture notes, and more

- [33] *Toroidal automorphic forms for function fields*. Thesis at the University of Utrecht, ISBN: 978-90-393-4825-3, online at <http://igitur-archive.library.uu.nl>, 2008.
- [34] *Algebraic groups over the field with one element*. Resumé in the conference proceedings of the Mathematische Arbeitstagung 2009.
- [35] *Blueprints and Tropical Scheme Theory*. Lecture notes accompanying a course at IMPA in March–June 2018. Online available at <http://oliver.impa.br/2018-Blueprints/lecturenotes.html>.
- [36] *Galois theory*. Lecture notes accompanying a course at IMPA in August–November 2018. Online available at <http://oliver.impa.br/galoistheory.pdf>.
- [37] Appendix to *Matroids over partial hyperstructures* by Matthew Baker and Nathan Bowler. Preprint, [arXiv:1709.09707](https://arxiv.org/abs/1709.09707), 2016.