

Martin Gallauer

Curriculum Vitae

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RESEARCH INTERESTS

I am interested in things of algebraic, geometric, arithmetic, or homotopical nature, including **motives**, **motivic homotopy theory**, **periods**, **\mathcal{D} -modules**, **tensor-triangular geometry**, **higher categories**, **rigid-analytic geometry**, **modular representation theory**, **exponential motives**.

POSTDOCTORAL EXPERIENCE

- 2021–present **Max Planck Institute for Mathematics, Bonn.**
Postdoctoral Fellow
- 2018–2021 **Oxford University.**
Titchmarsh Research Fellow
- 2015–2018 **University of California, Los Angeles.**
Hedrick Assistant Adjunct Professor

EDUCATION

- 2015 **PhD Mathematics**, *University of Zurich.*
Advisor: Joseph Ayoub
- 2011 **MA Philosophy**, *University of Zurich.*
- 2011 **MS Mathematics**, *University of Zurich.*
- 2011 **BS Mathematics**, *University of Zurich.*
- 2007–2008 Erasmus student exchange, *LMU Munich.*

RESEARCH ARTICLES

- **Supports for constructible systems**
Submitted, preprint available at [arXiv:2107.03731](https://arxiv.org/abs/2107.03731)
- **The six-functor formalism for rigid analytic motives**
with Joseph Ayoub, Alberto Vezzani
Submitted, preprint available at [arXiv:2010.15004](https://arxiv.org/abs/2010.15004)
- **The universal six-functor formalism**
with Brad Drew
Submitted, preprint available at [arXiv:2009.13610](https://arxiv.org/abs/2009.13610)

- **Permutation modules and cohomological singularity**
with Paul Balmer
Submitted, preprint available at [arXiv:2009.14093](https://arxiv.org/abs/2009.14093)
- **Finite permutation resolutions**
with Paul Balmer
Submitted, preprint available at [arXiv:2009.14091](https://arxiv.org/abs/2009.14091)
- **A note on Tannakian categories and mixed motives**
Bulletin of the London Mathematical Society 53 (2021), p. 119–129
[doi:10.1112/blms.12405](https://doi.org/10.1112/blms.12405)
- **Three real Artin-Tate motives**
with Paul Balmer
Submitted, preprint available at [arXiv:1906.02941](https://arxiv.org/abs/1906.02941)
- **tt-geometry of Tate motives over algebraically closed fields**
Compositio Mathematica 155 (2019), p. 1888–1923
[doi:10.1112/S0010437X19007528](https://doi.org/10.1112/S0010437X19007528)
- **Tensor triangular geometry of filtered modules**
Algebra and Number Theory 12 (2018), p. 1975–2003
[doi:10.2140/ant.2018.12.1975](https://doi.org/10.2140/ant.2018.12.1975)
- **An isomorphism of motivic Galois groups**
with Utsav Choudhury
Advances in Mathematics 313 (2017), p. 470–536
[doi:10.1016/j.aim.2017.04.006](https://doi.org/10.1016/j.aim.2017.04.006)
- **Homotopy theory of dg sheaves**
with Utsav Choudhury
Communications in Algebra 47 (2019), p. 3202–28
[doi:10.1080/00927872.2018.1554744](https://doi.org/10.1080/00927872.2018.1554744)
- **Traces in monoidal derivators, and homotopy colimits**
Advances in Mathematics 261 (2014), p. 26–84
[doi:10.1016/j.aim.2014.03.029](https://doi.org/10.1016/j.aim.2014.03.029)

LECTURE NOTES, SURVEYS

- **An introduction to six-functor formalisms**
Submitted, preprint available at [arXiv:2112.10456](https://arxiv.org/abs/2112.10456)
- **Permutation modules, Mackey functors, and Artin motives**
with Paul Balmer
Proceedings of ICRA2020 (accepted)
Preprint available at [arXiv:2107.11797](https://arxiv.org/abs/2107.11797)

OTHER DOCUMENTS

- **Statistical mechanics of kinks on a gliding screw dislocation**
with Boleininger, Dudarev, Swinburne, Mason, Perez
Physical Review Research 2 (2020)
[doi:10.1103/PhysRevResearch.2.043254](https://doi.org/10.1103/PhysRevResearch.2.043254)
- **Traces, homotopy theory, and motivic Galois groups**
PhD thesis, available at guests.mpim-bonn.mpg.de/gallauer
[doi:10.5167/uzh-121466](https://doi.org/10.5167/uzh-121466)
- **The Lefschetz-Verdier trace formula and a generalization of a theorem of Fujiwara**
following Varshavsky
MSc thesis, available at guests.mpim-bonn.mpg.de/gallauer
- **Beweise und mathematisches Wissen (Proofs and mathematical knowledge)**
MA thesis, available at guests.mpim-bonn.mpg.de/gallauer

WORK IN PREPARATION

- **Six-functor formalism for holonomic \mathcal{D} -modules**
with Brad Drew
Draft of a book, 300+ pages written
- **Monodromy operations on rigid-analytic motives**
with Alberto Vezzani
- **Cohomological exponentiation**
with Javier Fresán, Simon Pepin Lehalleur
- **The spectrum of Artin-Tate motives**
with Paul Balmer

SUPERVISION

Mfano Africa - Oxford Mathematics Virtual Mentorship Programme.

- Janvier Bahati Maheshe: Supersingular elliptic curve cryptography (2021)
Master's theses at Oxford.
- Callum Berry: Application of the Theory of Étale Fundamental Groups to Inverse Galois Problems (2021)
- Lucas de Jong: Finite Étale Covers and the Fundamental Group (2021)
- Zecheng Yi: Comparing Knots and Primes Using Étale Fundamental Groups (2021)
- Benjamin Zayton: The Grothendieck ring of varieties with potential (2020)
- Simon Cooper: The Tate conjecture for divisors on abelian varieties (2019)

- William Fourie: Grothendieck rings and Witt vectors (2019)
- Si Yu How: An exposition on algebraic K-theory of endomorphisms (2019)
- Jesse Pajwani: A computation of the algebraic K-theory of finite fields using Galois cohomology (2019)

TEACHING EXPERIENCE

Tutor at Keble College, Oxford.

- Geometry
- Topology
- Rings and Modules

Class tutor at Oxford.

- Introduction to Representation Theory
- Category Theory
- Elliptic Curves

Instructor at UCLA.

- Mathematical Cryptology
- Multivariable Calculus
- Discrete Structures
- Algebra
- Algebraic Geometry
- Linear Algebra and Applications
- Analysis

Teaching assistant at UZH.

- Algebraic Geometry 1 and 2
- Algebra
- Analysis 1 and 2
- Elements of Mathematics

LECTURE SERIES

- 9/2021 *An introduction to six-functor formalisms (mini-course, 3 lectures).*
The six-functor formalism and motivic homotopy theory, Milan

RESEARCH TALKS

- 2/2022 *Tbd.*
MPI Oberseminar, Bonn
- 1/2022 *Tbd.*
Oberseminar Topologie, Wuppertal
- 12/2021 *The derived category of permutation modules.*
New Directions in Group Theory and Triangulated Categories

- 2/2021 *Cohomological Singularity.*
BIREP – Representations of finite dimensional algebras at Bielefeld
- 5/2020 Canceled due to Covid.
87th BLOC Meeting, Bristol
- 4/2020 Canceled due to Covid.
Algebra and Analysis Seminar, Nottingham
- 2/2020 *Motivic tt-geometry.*
INI Seminar, Cambridge
- 12/2019 *Simplicity of Tannakian categories, and applications.*
Arithmetic Geometry seminar, HU Berlin
- 10/2019 *Simplicity of Tannakian categories.*
COW seminar
- 9/2019 *Simplicity of Tannakian categories in characteristic zero.*
Algebra seminar, Glasgow
- 5/2019 *Filtered modular representation theory and motivic tt-geometry.*
Topology seminar, Sheffield
- 4/2019 *Filtered modular representation theory and motivic tt-geometry.*
Algebra seminar, Manchester
- 4/2019 *How many real Artin-Tate motives are there?.*
KTH & SU Algebra and Geometry seminar, Stockholm
- 4/2019 *Exponentiating Grothendieck's six functors.*
Workshop on Derivators, Regensburg
- 3/2019 *How many real Artin-Tate motives are there?.*
Autour des cycles algébriques, Paris
- 3/2019 *How many real Artin-Tate motives are there?.*
Algebraic Geometry Seminar, Oxford
- 2/2019 *How many real Artin-Tate motives are there?.*
London Number Theory seminar, London
- 1/2019 *Motivic tt-geometry.*
Algebra seminar, IMPA
- 4/2018 *Motivic tt-geometry.*
Algebra seminar, UCLA
- 1/2018 *Motivic tt-geometry.*
Colloquium, University of Alberta
- 1/2018 *Motivic tt-geometry.*
Topics in Higher Category Theory seminar, Regensburg
- 1/2018 *Motivic tt-geometry.*
Algebra/Topology seminar, University of Copenhagen
- 11/2017 *Tensor triangular geometry of Tate motives.*
AMS Fall Western Sectional Meeting (Special Session on Algebraic Geometry), UC Riverside

- 11/2017 *Tensor triangular geometry of filtered modules.*
AMS Fall Western Sectional Meeting (Special Session on Homotopy Theory), UC
Riverside
- 09/2017 *Motivic Galois groups in characteristic 0.*
Motives for periods, FU Berlin
- 04/2016 *Motivic Hopf Algebras.*
Algebra seminar, USC
- 02/2016 *Traces and homotopy colimits.*
Topology seminar, UCLA
- 11/2015 *An isomorphism of motivic Galois groups.*
Algebra seminar, UCLA
- 9/2015 *Traces and homotopy colimits.*
Topology seminar, MIT
- 9/2015 *Traces in monoidal derivators.*
Dérivateurs à Barcelone, University of Barcelona
- 7/2015 *Traces in monoidal derivators.*
Young Topologists' Meeting 2015, EPF Lausanne
- 5/2014 *Traces in monoidal derivators.*
Oberseminar Topologie, Osnabrück
- 5/2014 *An isomorphism of motivic Galois groups.*
Oberseminar: Algebra, Zahlentheorie und algebraische Geometrie, Freiburg
- 3/2013 *Traces in monoidal derivators, and homotopy colimits.*
Groupe de travail "Algèbre et Topologie Homotopiques", Paris VII
- 4/2011 *The Lefschetz-Verdier trace formula and a generalization of a theorem of Fujiwara.*
ProDoc seminar, ETH Zurich

SELECTED EXPOSITORY TALKS

- 11/2021 *Motivic tt -geometry.*
MPI Topology seminar, Bonn
- 12/2020 *Algebraic algebraic geometry.*
Colloquium, EPFL
- 10/2020 *Algebraic algebraic geometry.*
North meets South Colloquium, Oxford
- 9/2018 *"The End is Nigh!" following Ayoub.*
Arbeitsgemeinschaft "Motives, Foliations and the Conservativity Conjecture", HU
Berlin
- 3/2017 *Motivic Galois groups, following Ayoub and Nori.*
Hot topics: Galois theory of periods and applications, MSRI
- 5/2016 *Rigid analytic geometry.*
Joint UCLA/USC Algebra seminar

- 11/2015 *“Hypersurfaces quartiques de dimension 3: non rationalité stable” following Colliot-Thélène and Pirutka.*
Joint UCLA/USC Algebra seminar
- 7/2014 *The p -adic periods of formal groups with formal multiplication.*
Summer school “Periods and heights of CM abelian varieties”, Alpbach, Austria
- 7/2013 *Galois representations for high weight modular forms.*
Summerschool “ p -adic Modular Forms”, Alpbach, Austria
- 12/2012 *What is... the trace of an endomorphism?.*
Zurich Graduate Colloquium, ETH & University of Zurich
- 9/2012 *Mixed Tate motives over \mathbb{Z} .*
Summer school “Multiple Zeta-Values”, Alpbach, Austria
- 7/2011 *Diagrams: Multiplicative structure and localization.*
Summer school “Motives, periods and transcendence”, Alpbach, Austria

LONGER RESEARCH VISITS

- 2–3/2020 Isaac Newton Institute, Cambridge, UK.
Programme “K-theory, algebraic cycles and motivic homotopy theory”
- 3–4/2019 ETH Institute for Theoretical Sciences, Switzerland.
Thematic programme “Modular forms, periods and scattering amplitudes”
- 1–2/2019 IMPA, Brazil.
Postdoctoral Summer Program
- 9/2018 Freiburg, Germany.
Visiting Brad Drew

CONFERENCES, WORKSHOPS, SUMMER SCHOOLS ATTENDANCE

- 9/2021 Summer school and Conference “The six-functor formalism and motivic homotopy theory”.
Milan
- 7/2019 Summer school “Arithmetic of connections”.
Monte Verità, Switzerland
- 7/2019 Conference “Periods and Motives”.
Berlin
- 4/2019 Workshop on Derivators.
Regensburg
- 9/2018 Arbeitsgemeinschaft “Motives, Foliations and the Conservativity Conjecture”.
HU Berlin
- 8/2018 Workshop “Equivariant and motivic homotopy theory”.
Newton Institute, Cambridge UK
- 11/2017 AMS Western Sectional Meeting.
UC Riverside

- 10/2017 Conference “Western Algebraic Geometry Symposium”.
UCLA
- 8–9/2017 Summer school “Motives for periods”.
FU Berlin
- 8/2017 Conference “Algebraic K-theory and arithmetic”.
Polish Academy of Sciences, Będlewo
- 3/2017 Workshop “Hot topics: Galois theory of periods and applications”.
MSRI, Berkeley
- 6/2016 Workshop “Triangulated Categories and Applications”.
Banff International Research Station, Banff, Canada
- 5/2016 Summer school “Correspondences and motives” (USC K-Theory Summer School).
University of Southern California, Los Angeles
- 1/2016 Conference “Complex Algebraic Geometry 2016”.
UC San Diego
- 9/2015 Conference “Dérivateurs à Barcelone”.
University of Barcelona
- 8/2015 Summer school “Algebraic K-theory and Trace Methods”.
University of Regensburg
- 7/2015 Conference “Young Topologists’ meeting 2015”.
EPF Lausanne
- 6/2015 Conference “Grothendieck Conference 2015”.
University of Montpellier
- 5/2015 Conference “Géométrie, arithmétique et physique: autour des motifs”.
IRMA Strasbourg
- 9/2014 Conference “VBAC 2014. Algebraic Varieties: Bundles, Topology, Physics”.
FU Berlin
- 8/2014 Summer school “Derivators”.
University of Freiburg
- 7/2014 Summer school “Periods and heights of CM abelian varieties”.
Alpbach, Austria
- 9/2013 Summer school and conference “Motivic Galois Groups”.
Alfréd Rényi Institute of Mathematics, Budapest
- 7/2013 Summer school “ p -adic Modular Forms”.
Alpbach, Austria
- 9/2012 Summer school “Multiple Zeta-Values”.
Alpbach, Austria
- 5–6/2012 Workshop “Semaine spéciale: Cohomologies and automorphic forms”.
Institut de Recherche Mathématique Avancée, Strasbourg

- 1/2012 Conference “Arithmetic, Motives and Moduli spaces”.
Institut Henri Poincaré, Paris
- 8/2011 Summer school “Rigidity”.
Johannes-Kepler-Research Center for Mathematics, Regensburg
- 7/2011 Summer school “Motives, periods and transcendence”.
Alpbach, Austria

ORGANIZATIONAL ACTIVITY

- 2021 Étale cohomology learning seminar, (with Håvard Damm-Johnsen, Andrés Ibáñez Núñez).
Oxford (online)
- 2019–2020 Oxford Number Theory Seminar, (with George Shakan).
Oxford
- 10/2017 Western Algebraic Geometry Symposium, (with Omprokash Das, Wenhao Ou, Burt Totaro).
IPAM, UCLA

SERVICE

- Refereeing service for *Advances in Mathematics*, *Algebraic and Geometric Topology*, *Applied Categorical Structures*, *Bulletin of the London Mathematical Society*, *Compositio Mathematica*, *Crelle’s Journal für die reine und angewandte Mathematik*, *Documenta Mathematica*, *Inventiones Mathematicae*, *Journal of Algebra*, *Journal of Number Theory*, *Journal of Pure and Applied Algebra*, *Journal of the European Mathematical Society*, *Pacific Journal of Mathematics*, *Quarterly Journal of Mathematics*, *Selecta Mathematica*, *Theory and Applications of Categories*
- Oxford undergraduate admissions interviews (2020)
- Departmental mentor for 1 master’s student, 1 PhD student (Oxford, 2020–2021)
- Representative of PhD and postdoctoral students in various committees at the department and university level (2012–2015)
- Member of the steering committee of the Association of Non-Professorial Academic Staff at the University of Zurich (**Vauz**) (2014–2015)
- Delegate in the Association of the academic midlevel staff at Swiss universities (**actionuni**) (2014–2015)

LANGUAGES

German, English, Portuguese, French, Spanish (in decreasing order of proficiency)

Last updated: 12/2021