Thomas Rüd

CONTACT INFORMATION

Department of Mathematics
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Citizenship : Switzerland, France

RESEARCH INTERESTS

Automorphic forms, Representation Theory, Local-global principle, Orbital Integrals, Shimura Varieties, Trace Formula, Beyond Endoscopy, Theory of Buildings.

EDUCATION/EMPLOYMENT

Massachusetts Institute of Technology(2022 - 2026)

Postdoctoral Fellow: dual appointment (lecturer/SNSF fellow)

- Host : Wei Zhang

University of British Columbia(2016 - 2022)

Ph.D. in Mathematics

- Advisor : Julia Gordon
- Thesis: *Tamagawa numbers of symplectic algebraic tori, orbital integrals, and mass formulae for isogeny class of abelian varieties over finite fields.*

École Polytechnique Fédérale de Lausanne (Sept.2014-Jan.2016)

M.Sc. in Mathematics,

- Advisor : Eva Bayer and Uriya First
- Master Thesis : *Admissibility of representations of totally disconnected locally compact groups.*

École Polytechnique Fédérale de Lausanne (Sept. 2011 - June 2014)

B.Sc. in Mathematics.

AWARDS

Winner of the 2025 MIT mathematics department SPOT Award in recognition for outstanding achievements.

Winner of the 2025 MIT mathematics department Lusztig Mentorship Award.

Winner of the 2024 MIT mathematics department Charles and Holly Housman Award for excellence in undergraduate teaching.

Winner of the 2020 UBC mathematics's *Graduate Research Award*.

GRANTS

Reciepient of an SNSF (Swiss NSF) postdoctoral fellowship (2022-2024).

PUBLICATIONS

T. Rüd, A. Bu, *A Projective Twist on the Hasse Norm Theorem*. https://arxiv.org/abs/2410.11159. Accepted. Journal de Théorie des Nombres de Bordeaux.

Appendix of the article *Counting abelian varieties over finite fields via Frobenius densities* by J. Achter, S. Altug, L. Garcia, and J. Gordon. Journal of Algebra and Number Theory (2023).

T. Rüd, *Explicit Tamagawa numbers for certain algebraic tori over number fields.* (2020) Mathematics Of Computations (2022).

T. Rüd, *Tamagawa numbers of symplectic algebraic tori, orbital integrals, and mass formulae for isogeny class of abelian varieties over finite fields*, Ph.D. thesis, University of British Columbia, 2022.

U. First and T. Rüd, *On uniform admissibility of unitary and smooth representations,* Archiv der Mathematik (2019) 112: 169.

Preprints

T. Rüd, *A comparison problem for abelian surfaces and descent for symplectic orbital integrals.* https://arxiv.org/abs/2505.19285.

T. Rüd, W. Zhang, *Jacquet–Rallis transfer for ramified quadratic extensions.* https://math.mit.edu/~rud/2025/papers/transfer.pdf

M. Middlezong, L. Qi, T. Rüd, *Orbital integrals for linear groups as local densities.* https://math.mit.edu/~rud/2025/papers/PRIMES2025_Orbital_Integrals.pdf

T. Can, T. Rüd, *Oligomorphic groups: Measures on colored trees and cyclic orders.* https://math.mit.edu/~rud/2025/papers/Oligomorphic_Groups.pdf

Invited Conference/ Seminar Talks

Relative Langlands Program, National University of Singapore, January 2026

University of Maryland, Park City number theory seminar, April 2025

Invited talk at the Conference on Celebrating the 100th year of UBC's Mathematics Department Building, April 2025

Canadian Mathematical Society winter conference (June 2023), session in representations of p-adic groups.

Mini conference on Beyond Endoscopy, Fields institute (April 2023) Toronto, Canada

University of Toronto Number Theory seminar, February 8th 2023 University of Toronto

MIT Number Theory Seminar (October 18 2022), Cambridge, USA

Workshop on Periods, functoriality and L-functions (January 2021) CIRM, Luminy, France

Graduate research award talk UBC mathematics department colloquium (February 2021).

Admissibility of representations of groups acting strong-transitively on affine buildings Buildings and affine Grassmannians (August 2019) CIRM, Luminy, France

Tamagawa numbers and algebraic tori 33rd Automorphic forms workshop (March 2019) Duquesne University

p-adics in SAGE, workshop towards implementation of p-adic field theory in SAGE. (August 2018) IMA, University of Minnesota

Outreach/ Service

Developer of the SageMath package on algebraic tori and lattices with group action.

Organizer of the Number Theory Seminar, 2024-2026, MIT

Founder/Leader of a cross-university group aimed at improving syllabi for mathematics education for incarcerated students. Joint with the Petey Greene program.

Reviewer for mathscinet

Reviewer of MIT PRIMES 2024 research papers.

Advisor of 10 undergraduate students at MIT (Diriyeh Lama, Li Anna, Liu Julia, Qu Joyce, Lasya Balachandran Lasya, Hadjiivanov Michael, Haque Shaherul, Lou Benjamin, Nag Ritam, Simon Josh).

Research mentor for PRIMES research program 2022-2025, prestigious program mentoring a high school student through a research project. (Mentee: Alan Bu, Thanh Can, Michael Middlezong, Lucas Qi)

Head Instructor for mathematics in Petey Greene's College Bridge program, teaching mathematics in a medium security prison.

Proctored the William Lowell Putnam Mathematical Competition.

Organizer of the number theory seminar, 2019, University of British Columbia.

Proctored the Canadian Gray Jay math competition

Graded the Canadian Open Math Competition (COMC).

Referree work

Refereed articles for Transactions of the AMS, Algebra and Number Theory, Journal of Number Theory, Canadian Journal of Mathematics, Pacific Journal of Mathematics.

Teaching Experience

Spring	2026	Instructor, 18.704 (seminar in algebra), MIT.
Fall	2025	Course admin, 18.02 (multivariable calculus), MIT.
Spring	2025	Instructor, 18.01 (single-variable calculus), MIT.
Fall	2024	Course admin, 18.01A/18.02A, MIT.
Spring	2024	Instructor, 18.781 (number theory), MIT.
Fall	2022	Recitation instructor, 18.01A/18.02A, MIT.
Fall	2021	Instructor, MATH 104: Differential calculus, UBC. I was one of the two lead instructors, in charge of a class of 1200 students.
Winter	2021	Instructor, MATH 100 Vantage: Differential calculus, University of British Columbia.
Fall	2019	Lecturer, MATH 184: Differential calculus, University of British Columbia

	Fall	2018	Lecturer, MATH 104 : Differential calculus, University of British Columbia

Semester Thesis
Other research experience

2014	*Resolution of singularities on projective curves.* Advisors: Dimitri Wyss, Tamas Hausel. EPFL.
2014	*An approach to projective geometry and puncturing problem.* Advisor: David McKinnon. University of Waterloo .
2013	*Hopf Algebras and rooted trees.* Advisor: Shengda Hu. University of Waterloo .
2013	*Yoneda's Lemma and Simplicial complexes.* Advisors: Kathryn Hess, Martina Rovelli. EPFL.

Relevant Skills

Languages:	English, French, German, Swedish (basic)
Programming:	Python, C++, SageMath, Julia (Oscar), Magma, Mathematica, LaTeX, Maple, Caml, HTML/CSS, php, javascript.

Extended visits

Fall	2015	Visiting Student, University of British Columbia
Winter	2014	Visiting Student, University of Waterloo
Fall	2013	Visiting Student, University of Waterloo

Teaching Assistant

2020 Fall	MATH 184 : Differential Calculus, head TA	UBC
2020 Winter	MATH 323 : Introduction to rings and modules	UBC
2019 Winter	MATH 510 : Functional analysis	UBC
2018 Winter	MATH 121, honours integral calculus	UBC
2017 Fall	MATH 120, honours differential calculus	UBC
2017 Winter	MATH 323, rings and modules	UBC
2016 Winter	MATH 322, group theory	UBC
2015 Fall	MATH 120, honours differential calculus	UBC
2015 Winter	Analysis IV, physics faculty	EPFL
2014-2015	Linear algebra I-II	EPFL
2014–2015	Analysis I-II, mathematics faculty	EPFL
2014 Fall	Translator for the Numerical analysis class, physics faculty	EPFL
2012–2013	Analysis I-II, mathematics faculty	EPFL

Study Seminar Talks

I organized UBC's learning seminar in automorphic forms (MATH 592B, MATH 600D) for which I gave most talks.

Multiple talks in the study seminars on the following topics:

- *Torsors over fields* - STAGE seminar
- *Leftschetz trace formula and geometrical Satake*
- *Borel-Weil-Bott Theorem and application to Weyl character formula*
- *Intertwining operators and their application to the explicit Satake isomorphism*
- *Spherical representations and Satake isomorphism*
- *Principally polarized abelian varieties, moduli spaces, and theta functions*
- *Tamagawa Numbers and Tori*
- *Cohomology of algebraic tori in SAGE*
- *p-adic and motivic Igusa zeta-functions; proof of rationality using cell decomposition*
- *Introduction to Grothendieck topologies and the étale site*
- *Counting points over finite fields with power series, and the Hasse-Weil zeta function*
- *Projective geometry and the arithmetic puncturing problem*
- *Amenability and the Banach-Tarski Paradox*
- *Around Hopf Algebras and trees*
- *Hearing the shape of a drum*

Conferences Summmer Schools attended

Trace Formula, Endoscopic Classification and Beyond: the Mathematical Legacy of James Arthur, Fields institute, Toronto, Canada

Summer School and Workshop on Relative Langlands Duality, USA (2024)

Arizona winter school 2022: Automorphic forms beyond GL(2), USA (2022)

Basic Functions, Orbital Integrals, and Beyond Endoscopy., BIRS, Canada (2021)

Algorithmic Number Theory Symposium., Online (2020)

Buildings and affine Grassmannians., CIRM, France (2019)

From the Fundamental Lemma to Discrete Geometry, to Formal Verification. A conference in honour of Thomas C. Hales on the occasion of his 60th birthday., University of Pittsburgh (2018)

Lie Theory, Cohomology, and Geometry in Wildrose Country. A workshop in honour of Vladimir Chernousov and Arturo Pianzola., University of Alberta. (2017)

ALGAR Summer School 2017. Quadratic forms and local global principle., University of Antwerp (2017)

Western Algebraic Geometry Symposium, Colorado State University. (2016)

ABC Algebra Workshop. Geometric and Cohomological Methods in Algebra., University of Alberta. (2016)

Local representation theory and simple groups, summer school, Ecole Polytechnique Fédérale de Lausanne. (2016)