Martin Lüdtke

Curriculum Vitae

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https://martinluedtke.github.io

Mathematical Interests

arithmetic geometry, rational points, non-abelian Chabauty, fundamental groups, section conjecture

Academic career

2021–present **Postdoctoral Researcher**, *Rijksuniversiteit Groningen*, Groningen (Netherlands)
Research on non-abelian Chabauty in the group of Steffen Müller

2020–2021 **Postdoctoral Researcher**, *Goethe-Universität*, Frankfurt am Main (Germany)
Research on anabelian geometry in the GAUS cluster Darmstadt/Frankfurt/Heidelberg (Geometry and Arithmetic of Uniformized Structures)

2015–2020 **PhD**, *Goethe-Universität*, Frankfurt am Main (Germany), magna cum laude
Dissertation: *The p-adic section conjecture for localisations of curves*
Advisor: Jakob Stix
Date of defense: 14.12.2020

2013–2015 **M.Sc. in Mathematics**, *Ruprecht-Karls-Universität*, Heidelberg (Germany), 1.0
Thesis: *Birational Anabelian Geometry of Curves over Algebraically Closed Fields*
Advisor: Alexander Schmidt

2012–2013 **MASt in Mathematics**, *University of Cambridge*, Cambridge (UK), honours
Part iii of the mathematical tripos
Part iii essay: *The Grunwald–Wang Theorem*
Advisor: Tom Fisher

2009–2012 **B.Sc. in Mathematics**, *Ruprecht-Karls-Universität*, Heidelberg (Germany), 1.0
Thesis: *p-adic L-functions and Leopoldt's Conjecture*
Advisor: Kay Wingberg

2000–2009 **High school**, *Uhland-Gymnasium*, Tübingen (Germany), 1.3

Publications

2024 **Refined Selmer equations for the thrice-punctured line in depth two**
(with A. Best, L. A. Betts, T. Kumpitsch, A. McAndrew, L. Qian, E. Studnia and Y. Xu)
Math. Comp. **93** (2024), 1497–1527
DOI: https://doi.org/10.1090/mcom/3898

2023 **Linear and quadratic Chabauty for affine hyperbolic curves**
(with J. S. Müller and M. Leonhardt)
Int. Math. Res. Not. IMRN **21** (2023), 18752–18780
DOI: https://doi.org/10.1093/imrn/rnad185

2020 **The p-adic section conjecture for localisations of curves**
Doctoral thesis at Goethe-Universität Frankfurt supervised by Jakob Stix
URN: urn:nbn:de:hebis:30:3-574318

2018 **Birational Anabelian Geometry of Curves over Algebraically Closed Fields in Arbitrary Characteristic**
Isr. J. Math. **227** (2018), 987–1011
DOI: https://doi.org/10.1007/s11856-018-1757-2

Preprints

2024 **Refined Chabauty–Kim computations for the thrice-punctured line over $\mathbb{Z}[1/6]$**
accepted for Algorithmic Number Theory Symposium XVI proceedings
https://arxiv.org/abs/2402.03573

2023 **Chabauty–Kim and the Section Conjecture for locally geometric sections**
(with L. A. Betts and T. Kumpitsch), submitted
https://arxiv.org/abs/2305.09462

2022 **Foundations of the nonabelian method of Chabauty**
(with M. Kim)
Lecture notes for Minhyong Kim's course at the Arizona Winter School 2020
to be published in the AWS proceedings volume

Teaching

2024 **Lecturer Topics in Algebra and Geometry**, Groningen (prospective)
2023 **Lecturer Group Theory**, Groningen
2022/23 **Lecturer Advanced Algebraic Structures**, Groningen, with S. Müller
2022 **Lecturer Group Theory**, Groningen, with P. Kılıçer
2021/22 **Security and Coding Theory**, Groningen, with P. Kılıçer and S. Müller
2021 **Seminar Central Simple Algebras**, Frankfurt, with J. Stix and T. Kumpitsch
2019/20 **TA Linear Algebra**, Frankfurt
2019 **TA Geometry and Algebra**, Frankfurt
2018/19 **TA Linear Algebra**, Frankfurt
2018 **TA Elementary Mathematics II**, Frankfurt
2018 **TA Foundations of Algebra**, Frankfurt
2017 **TA Seminar Proofs from the Book**, Frankfurt, with J. Stix
2015–2017 **Lead Coordinator of "Study centre"**, Frankfurt
2015 **Tutor Functional Analysis**, Heidelberg
2014/15 **Tutor Algebraic Geometry 1**, Heidelberg
2014 **Tutor Algebra 2**, Heidelberg
2013/14 **Tutor Algebra 1**, Heidelberg
2013 **STIMULUS Volunteer**, *Long Road Sixth Form College*, Cambridge
2012 **Tutor Theoretical Computer Science**, Heidelberg
2010/11 **Tutor Practical Computer Science**, Heidelberg

Supervised students

2022 **Niek Veltman**
Bachelor project: *Linear Relations for Multiple Zeta Values*

Refereeing

Essential Number Theory
Indagationes Mathematicae
Expositiones Mathematicae

Talks

Oct 2024 **MFO workshop Anabelian Geometry and Representations of Fundamental Groups**, Oberwolfach
Non-abelian Chabauty and the Selmer Section Conjecture

Jul 2024 **Algorithmic Number Theory Symposium (ANTS XVI)**, MIT
Refined Chabauty–Kim computations for the thrice-punctured line over $\mathbb{Z}[1/6]$

Mar 2024 **Algebraic Days of Gabon**, Libreville
Fundamental groups in arithmetic and geometry (5 lectures with exercise sessions)

Feb 2024 **Winter workshop Chabauty–Kim**, Heidelberg
Linear and quadratic Chabauty for affine hyperbolic curves

Feb 2024 **Winter workshop Chabauty–Kim**, Heidelberg
Foundations of Chabauty–Kim (2 lectures and exercise session)

Nov 2023 **Rational points consortium meeting**, Utrecht
Rational points and the étale fundamental group

Jun 2023 **Intercity Number Theory Seminar**, Amsterdam
Chabauty–Kim and the locally geometric section conjecture

May 2023 **Online seminar on Selmer schemes organised by M. Kim**
Mixed Tate Selmer schemes beyond the polylog quotient

Jan 2023 **AGNT seminar at Ben Gurion University**, Be'er Scheva (online)
Non-abelian Chabauty for the thrice-punctured line and the Selmer section conjecture

Nov 2022 **GAUS seminar**, Heidelberg
Non-abelian Chabauty for the thrice-punctured line and the Selmer section conjecture

Oct 2022 **Junior Algebraic Geometry Seminar**, Leiden
Non-abelian Chabauty for the thrice-punctured line

Oct 2022 **Groningen/Oldenburg seminar**, Groningen
The motivic Selmer scheme of the thrice-punctured line

Nov 2021 **DIAMANT Symposium**, Utrecht
Refined Selmer equations for the thrice-punctured line

Nov 2021 **Ruth Moufang Lecture, introductory talk**, Frankfurt (online)
Algebraic curves

Jul 2021 **Groningen algebra seminar**, Groningen (online)
Refined Selmer equations for the thrice-punctured line

Mar 2021 **Oberwolfach workshop Homotopic and Geometric Galois Theory**, Oberwolfach
The p-adic section conjecture for localisations of curves

Dec 2020 **Online seminar on Selmer schemes organised by M. Kim**
Refined Selmer equations for the thrice-punctured line in depth 2

Nov 2019 **Pro-Doc seminar**, Frankfurt
Étale fundamental groups and the section conjecture

Jun 2019 **DaFra seminar**, Darmstadt/Frankfurt
The Coleman–Chabauty method

May 2019 **Kleine AG Learning Seminar**, Bonn
Serre's Modularity Conjectures

Nov 2018 **Young Researchers in Algebraic Number Theory**, Sheffield
Anabelian Geometry

May 2018 **Frankfurt learning seminar**, Frankfurt
Log Geometry and the Kummer-étale site

2018 **DaFra seminar**, Darmstadt/Frankfurt
Tamely Ramified Geometric Class Field Theory

Nov 2017 **HU Berlin Algebra Seminar**, Berlin
Birational Anabelian Reconstruction of Curves

Nov 2017 **Frankfurt learning seminar**, Frankfurt
Cartan involutions on algebraic groups and Lie algebras

Nov 2017 **Kleine AG learning seminar**, Heidelberg
Heights on abelian varieties

Jun 2017 **Banff workshop Nilpotent Fundamental Groups**, Banff
Birational Anabelian Geometry of Curves

May 2017 **Student symposium on analogies**, Paris
Milnor invariants and higher residue symbols

Dec 2016 **DaFra seminar**, Darmstadt/Frankfurt
Hodge theory

Sep 2016 **Heidelberg Laureate Forum**, Heidelberg
Ranks of Elliptic Curves (workshop with A. Wiles)

May 2016 **DaFra seminar**, Darmstadt/Frankfurt
Unramified cohomology

Sep 2016 **Student conference of the Deutsche Mathematikervereinigung**, Hamburg
Galois Groups and Fundamental Groups

Sep 2015 **Kleine AG learning seminar**, Heidelberg
Monads and Generalised Rings

Jun 2015 **Frankfurt algebra seminar**, Frankfurt
Birational Anabelian Geometry of Curves

Awards

Apr–May 2016 **Stay at Max Planck Institute for Mathematics**, Bonn
Main prize of the student conference of the Deutsche Mathematikervereinigung DMV

2010–2015 **Studienstiftung des Deutschen Volkes, scholarship**

2006–2009 **Various prizes at competitions for high school students**
e.g. Bundeswettbewerb Mathematik, Bundeswettbewerb Informatik, Abiturpreise Mathematik & Physik, Intel Leibniz Challenge, MPI student contest on self-organization in information processing

Languages

German, native

English, fluent

Dutch, good

Spanish, good

Latin, good

French, basic