

# David Ter-Borch Gram Lilienfeldt

Post-Doctoral Fellow and Institute Council Member



## Contact

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## Employment

- 2023–2025 **Edixhoven Post-Doctoral Fellow**, Leiden, NL  
Mathematical Institute | Leiden University
- 2021–2023 **Emily Erskine Post-Doctoral Research Fellow**, Jerusalem, IL  
Einstein Institute of Mathematics | Hebrew University of Jerusalem | Mentor: Ari Shnidman

## Education

- 2016–2021 **Doctor of Philosophy**, Mathematics Montreal, CAN  
McGill University | Advisor: Henri Darmon | Date of defense: 20 May 2021
- 2014–2016 **Master of Science**, Mathematics Lausanne, CH  
École Polytechnique Fédérale de Lausanne (EPFL) | Advisor: Eva Bayer-Fluckiger | GPA: 5.89/6
- Fall 2015 **Exchange Master Thesis**, Mathematics Cambridge, USA  
Harvard University | Advisor: Benedict H. Gross | Sep 2015 - Feb 2016
- 2011–2014 **Bachelor of Science**, Mathematics Lausanne, CH  
École Polytechnique Fédérale de Lausanne (EPFL)
- 2008–2011 **French/Danish High School Diploma**, Scientific Option St-Germain-en-Laye, FR  
Lycée International de St-Germain-en-Laye | High honours (Mention Très Bien)

## Academic Visits

- May 2023 **IMJ-PRG**, Host: Pierre Charollois, Paris, FR
- Nov 2022 **Dartmouth College**, Host: Ari Shnidman, Hanover, USA
- Fall 2015 **Harvard University**, Host: Benedict H. Gross, Cambridge, USA

## Fellowships, Scholarships, and Distinctions

- 2023–2025 **Inaugural Edixhoven Post-Doctoral Fellowship**
- 2021–2023 **Emily Erskine Endowment Fund Post-Doctoral Research Fellowship**
- Winter 2021 **ISM Scholarship for Outstanding PhD Candidates**, Institut des Sciences Mathématiques
- Feb 2020 **Alexis and Charles Pelletier Fellowship**, Faculty of Science of McGill University
- 2018–2019 **ISM Graduate Scholarship**, Institut des Sciences Mathématiques au Québec
- Fall 2018 **Teaching Assistant Honourable Mention**, *Algebra I*, (MATH-235), McGill University
- 2017–2018 **ISM Travel Award & GREAT Travel Awards**, ISM & McGill University
- Fall 2017 **Teaching Assistant Honourable Mention**, *Algebra I*, (MATH-235), McGill University

## Relevant Skills and Qualifications

- Languages **Danish** (native), **French** (native), **English** (CAE Grade A: level C2), **Spanish** (intermediate), **Dutch** (beginner, currently enrolled in A1/A2 classes).
- Software **Latex** (high level), **C++** (medium level), **SageMath**, **Magma**, **Pari/GP** (familiarity).
- 2023-2027 Qualifié aux fonctions de Maître de Conférence (no. qualification 23225388047)

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## PhD Thesis

### Algebraic cycles and Diophantine geometry: generalised Heegner cycles, quadratic Chabauty and diagonal cycles

McGill University | Advisor: Henri Darmon | Date of defense: 20 May 2021 | 333 pages [\(link\)](#)

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## Publications and Preprints

- 7) **Polylogarithmic motivic Chabauty-Kim for  $\mathbb{P}^1 - \{0, 1, \infty\}$ : the geometric step via resultants**  
Joint with David Jarossay, Francesco Sattone, Ariel Weiss, and Sa'ar Zehavi  
In preparation
- 6) **Archimedean heights of generalized Heegner cycles**  
Joint with Ari Shnidman  
In preparation
- 5) **Experiments with Ceresa classes of cyclic Fermat quotients**  
Joint with Ari Shnidman  
Proceedings of the American Mathematical Society **151** (2023), 931 – 947 [\(link\)](#) 17 pages
- 4) **Torsion properties of modified diagonal classes on triple products of modular curves**  
Canadian Mathematical Bulletin **66** (2023), 68 – 86 [\(link\)](#) 19 pages
- 3) **Heegner cycles in Griffiths groups of Kuga-Sato varieties**  
Mathematical Research Letters, accepted for publication on November 9, 2022  
arXiv version: 2107.06731 [\(link\)](#) 30 pages
- 2) **Geometric quadratic Chabauty over number fields**  
Joint with Pavel Čoupek, Luciana X. Xiao, and Zijian Yao  
Transactions of the American Mathematical Society **376** (2023), 2573 – 2613 [\(link\)](#) 41 pages
- 1) **Generalised Heegner cycles and the complex Abel-Jacobi map**  
Joint with Massimo Bertolini, Henri Darmon, and Kartik Prasanna  
Mathematische Zeitschrift **298**(2021), 385–418 [\(link\)](#) 34 pages

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## Teaching Experience

### Instructor, Leiden University

*Elliptic curves* (Mastermath course) with Marco Streng Leiden, NL  
Spring 2025  
*Linear Algebra for Computer Scientists II* with Olga Lukina Winter 2024  
*Linear Algebra for Computer Scientists I* with Olga Lukina Fall 2023

### Teaching Assistant, McGill University

*Algebra I* Montreal, CAN  
Fall 2019  
*Algebra I* (received Honourable Mention for Teaching) Fall 2018  
*Algebra I* (received Honourable Mention for Teaching) Fall 2017  
*Calculus II* Winter 2017

### Teaching Assistant, École Polytechnique Fédérale de Lausanne (EPFL)

Lausanne, CH  
*Introduction to Algebraic Number Theory* Spring 2015  
*Analysis I* Fall 2014  
*Introduction to Algebraic Number Theory* Spring 2014  
*Analysis II* Spring 2014

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## Seminars Organised

- Spring 2022 **Elliptic Units Seminar**, Hebrew University Jerusalem, IL  
Co-organised with Ari Shnidman
- Spring 2019 **Etale Cohomology Graduate Seminar**, McGill University Montreal, CAN  
Co-organised with Francesc Gispert

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## Service and Outreach

Feb 2024	<b>Committee Member</b> , Master Thesis of David van der Vorm	Leiden, NL
Jan 2024	<b>Reviewer</b> , NSERC Discovery Grant proposal	
2024-2025	<b>Member</b> , Institute Council of the Mathematical Institute	Leiden, NL
12 Dec 2023	<b>Speaker</b> , PhD Day event organized by the Mathematical Institute	Leiden, NL
19 Oct 2023	<b>Interviewee</b> , The Faculty of Science wrote an article about my fellowship	( <a href="#">link</a> )
2023–	<b>Reviewer</b> , Mathematical Reviews (reviewer number 159157)	
Jan 2021	<b>Recommendation</b> , Letter of recommendation, McGill University Provided reference in support of the nomination of Niky Kamran for the David Thomson Award for Graduate Supervision and Teaching.	Montreal, CAN
Fall 2020	<b>Member</b> , <i>The Math Equity Discussion Club</i> , McGill University	Montreal, CAN
Apr 2019	<b>Advisor</b> , <i>The Peer Advising Desk</i> , McGill University Included training on how to deal with students in distress.	Montreal, CAN
2012-2013	<b>Mentor</b> , <i>Coaching de la Section de Mathématiques</i> , EPFL Committee responsible for guiding incoming students in the Department of Mathematics during their first year of study, both socially and mathematically.	Lausanne, CH

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## Invited Talks

13 May 2024	<b>The Ceresa cycle in Arithmetic and Geometry</b> , ICERM Title: <i>Archimedean heights of generalized Heegner cycles</i>	Providence, USA
11 Apr 2024	<b>Séminaire de Théorie des Nombres</b> , Université Grenoble Alpes Title: <i>La formule de Gross-Zagier pour les cycles de Heegner généralisés</i>	Grenoble, FR
14 Mar 2024	<b>AGNT Seminar</b> , Vrije Universiteit Amsterdam Title: <i>Experiments with Ceresa classes of cyclic Fermat quotients</i>	Amsterdam, NL
17 Nov 2023	<b>Intercity Number Theory Seminar</b> , Leiden University Title: <i>The Gross-Zagier formula for generalized Heegner cycles</i>	Leiden, NL
7 Nov 2023	<b>Algebra Seminar</b> , University of Groningen Title: <i>The Gross-Zagier formula for generalized Heegner cycles</i>	Groningen, NL
23 Oct 2023	<b>Number Theory Seminar</b> , The University of Warwick Title: <i>The Gross-Zagier formula for generalized Heegner cycles</i>	Coventry, UK
19 Jun 2023	<b>AGNT Seminar</b> , Ben-Gurion University of the Negev Title: <i>Archimedean local heights of generalized Heegner cycles</i>	Be'er Sheva, IL
28 Feb 2023	<b>Séminaire de Théorie des Nombres</b> , Université Clermont Auvergne Title: <i>Cycles de Ceresa et quotients de courbes de Fermat</i>	Clerm.-Ferr., FR
23 Feb 2023	<b>Séminaire de Théorie des Nombres</b> , Université Grenoble Alpes Title: <i>Cycles de Ceresa et quotients de courbes de Fermat</i>	Grenoble, FR
21 Dec 2022	<b>Number Theory Seminar</b> , University of Copenhagen Title: <i>Experiments with Ceresa classes of cyclic Fermat quotients</i>	Copenhagen, DK
9 Dec 2022	<b>Séminaire de Théorie des Nombres</b> , Université de Caen Normandie Title: <i>Cycles de Ceresa et quotients de courbes de Fermat</i>	Caen, FR
9 Dec 2022	<b>Séminaire Kudla <math>p</math>-adique</b> , Université de Caen Normandie Title: <i>Cycles de Heegner dans les groupes de Griffiths de variétés de Kuga-Sato</i>	Caen, FR
20 Oct 2022	<b>Séminaire d'Arithmétique à Lyon</b> , ENS Lyon Title: <i>Cycles de Ceresa et quotients de courbes de Fermat</i>	Lyon, FR
17 Oct 2022	<b>Séminaire de Théorie des Nombres</b> , IMJ-PRG Title: <i>Cycles de Ceresa et quotients de courbes de Fermat</i>	Paris, FR
2 Mar 2022	<b>One-day Symposium in Number Theory</b> , Hebrew University Title: <i>Heegner cycles in Griffiths groups of Kuga-Sato varieties</i>	Jerusalem, IL

- 8 Dec 2021 **AGNT Seminar**, Ben-Gurion University of the Negev Be'er Sheva, IL  
Title: *Experiments with Ceresa classes of cyclic Fermat quotients*
- 15 Nov 2021 **Number Theory Seminar**, Hebrew University Jerusalem, IL  
Title: *Experiments with Ceresa classes of cyclic Fermat quotients*
- 20 May 2021 **Doctoral Oral Defence**, McGill University Montreal, CAN  
Title: *Algebraic cycles and Diophantine geometry*
- 25 Jan 2021 **Séminaire de Théorie des Nombres**, IMJ-PRG Paris, FR  
Title: *Cycles algébriques et arithmétique des courbes elliptiques*
- 15 Dec 2020 **Number Theory Seminar**, University of Copenhagen Copenhagen, DK  
Title: *Algebraic cycles and arithmetic geometry*
- 15 Nov 2019 **Algebra and Geometry Seminar**, Laval University Québec City, CAN  
Title: *Generalised Heegner cycles and the complex Abel-Jacobi map*

## Contributed Talks

- 23 Nov 2023 **DIAMANT Symposium**, Eindhoven Eindhoven, NL  
Title: *Experiments with Ceresa classes of cyclic Fermat quotients*
- 10 Feb 2023 **Symposium on Arithmetic Geometry and its Applications**, CIRM Luminy, FR  
Title: *Experiments with Ceresa classes of cyclic Fermat quotients*
- 26 Sep 2020 **Maine-Quebec Number Theory Conference**, Laval University Québec City, CAN  
Title: *Geometric quadratic Chabauty over number fields*
- 11 Mar 2020 **Arizona Winter School Student Presentation**, University of Arizona Tucson, USA  
Title: *Geometric quadratic Chabauty over number fields*
- 5 Oct 2019 **Maine-Quebec Number Theory Conference**, University of Maine Orono, USA  
Title: *Generalised Heegner cycles and Griffiths groups of infinite rank*
- 19 May 2019 **XXIIeme Colloque panquébécois de l'ISM**, Université de Montréal Montreal, CAN  
Title: *Generalised Heegner cycles and Griffiths groups of infinite rank*

## Learning Seminar Talks

- 22 Feb 2024 **Postdoc Seminar**, Leiden University Leiden, NL  
Title: *My mathematical life: a tale of cycles, climbing, and curves*
- 6 Dec 2023 **Vonk Group Seminar**, Leiden University Leiden, NL  
Title: *Eisenstein cocycles for  $GL_2$*
- 7 Nov 2023 **Introduction NT Seminar**, University of Groningen Groningen, NL  
Title: *The three pillars of BSD*
- 24 May 2023 **IMJ-PRG Seminar**, IMJ-PRG Paris, FR  
Title: *Introduction to elliptic units*
- Spring 2023 **Honda–Tate Seminar**, Hebrew University Jerusalem, IL  
Title: *Rosati and Frobenius*
- Spring 2022 **Elliptic Unit Seminar**, Hebrew University Jerusalem, IL  
Title: *Introduction to Coates–Wiles / Basic properties of elliptic units*
- Fall 2021 **Euler System Seminar**, Ben-Gurion University of the Negev Be'er Sheva, IL  
Title: *Beilinson's formula and the Rankin–Selberg method*
- Fall 2021 **Shnidman Group Seminar**, Hebrew University Jerusalem, IL  
Title: *Introduction to algebraic cycles and the Beilinson–Bloch conjecture*
- Winter 2020 **Lawrence–Venkatesh Graduate Seminar**, McGill University Montreal, CAN  
Title: *The proof of Mordell's conjecture: outline of the strategy and first steps*
- Feb 2020 **Graduate Student Seminar**, McGill University Montreal, CAN  
Title: *The Birch and Swinnerton–Dyer Conjecture*

Feb 2020	<b>Graduate Student Seminar</b> , Université de Montréal Title: <i>The Birch and Swinnerton-Dyer Conjecture</i>	Montreal, CAN
Fall 2019	<b>Derived Categories Graduate Seminar</b> , Concordia University Title: <i>Localization of triangulated categories</i>	Montreal, CAN
Fall 2019	<b>Étale Cohomology Graduate Seminar</b> , McGill University Title: <i>The étale structure sheaf / Spectral sequences / The cycle class map / Chern classes</i>	Montreal, CAN
Fall 2018	<b>Mazur–Tate–Teitelbaum Graduate Seminar</b> , McGill University Title: <i>Hida families of ordinary <math>p</math>-adic modular forms and their Galois representations</i>	Montreal, CAN
Winter 2018	<b>Sato–Tate Graduate Seminar</b> , McGill University Title: <i>Automorphic forms for <math>GL_n</math> and their <math>L</math>-functions</i>	Montreal, CAN
Fall 2017	<b>Mock Modular Forms Seminar</b> , Concordia University Title: <i>Weak harmonic Maass forms and mock modular forms</i>	Montreal, CAN
Winter 2017	<b>Fermat’s Last Theorem Graduate Seminar</b> , McGill University Title: <i>Overview of the proof of the modularity lifting theorem</i>	Montreal, CAN
Fall 2016	<b>Iwasawa Theory Graduate Seminar</b> , McGill University Title: <i>Local units and interpolating power series</i>	Montreal, CAN

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## Conferences Attended

May 2024	<b>The Ceresa cycle in Arithmetic and Geometry</b> , ICERM	Providence, USA
Dec 2023	<b>Eisenstein Days</b> , University College London	London, UK
Nov 2023	<b>DIAMANT Symposium</b> , Holiday Inn Eindhoven	Eindhoven, NL
Jul 2023	<b>Iwasawa 2023</b> , University of Cambridge	Cambridge, UK
Feb 2023	<b>Symposium on Arithmetic Geometry and its Applications</b> , CIRM	Luminy, FR
Sep 2022	<b>Elliptic curves and modular forms in AG</b> , Università degli Studi di Milano	Milan, IT
Sep 2022	<b>School on Arithmetic Geometry</b> , Universität Duisburg-Essen	Essen, DE
May 2022	<b>30e Rencontres arithmétiques de Caen</b> , Université de Caen Normandie	Caen, FR
Sep 2020	<b>Maine-Quebec Number Theory Conference</b> , Laval University	Québec City, CAN
Fall 2020	<b>Thematic Semester: Cohomology in Arithmetic</b> , CRM	Montreal, CAN
May 2020	<b>XXIIIeme Colloque panquébécois de l’ISM</b> , Concordia University	Montreal, Canada
Mar 2020	<b>AWS 2020: Nonabelian Chabauty</b> , University of Arizona	Tucson, USA
Oct 2019	<b>Automorphic <math>p</math>-adic <math>L</math>-functions and regulators</b> , Université de Lille	Lille, FR
Oct 2019	<b>Maine-Quebec Number Theory Conference</b> , University of Maine	Orono, USA
May 2019	<b>XXIIeme Colloque panquébécois de l’ISM</b> , Université de Montréal	Montreal, CAN
May 2019	<b>Geometrization of the local Langlands program</b> , McGill University	Montreal, CAN
Mar 2019	<b>Montreal-Toronto Workshop in Number Theory</b> , CRM	Montreal, QC
May 2018	<b>The Bellairs Workshop in Number Theory</b> , Bellairs Research Institute	Barbados, BB
Mar 2018	<b>AWS 2018: Iwasawa Theory</b> , University of Arizona	Tucson, USA
Jan 2018	<b>Montreal-Toronto Workshop in Number Theory</b> , CRM	Montreal, CAN
Dec 2017	<b>Recent Developments on Special Values of L-functions</b> , EPFL	Lausanne, CH
Oct 2017	<b>Maine-Quebec Number Theory Conference</b> , University of Maine	Orono, USA
Aug 2017	<b>Special cycles on Shimura Varieties and Iwasawa Theory</b> , EPFL	Lausanne, CH
Aug 2017	<b>Workshop on Euler Systems and Special Values of L-functions</b> , EPFL	Lausanne, CH
Dec 2016	<b>Montreal-Toronto Workshop in Number Theory</b> , CRM	Montreal, QC
Oct 2016	<b>Maine-Quebec Number Theory Conference</b> , Laval University	Québec City, QC

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## References

**Henri Darmon**

Distinguished James McGill Professor  
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**Jan Vonk**

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