

Dennis Eriksson, Professor

contact

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interests

Arithmetic geometry
Complex geometry
Algebraic geometry
Arakelov theory
Calabi–Yau manifolds
Hodge theory
Analytic torsion
Enumerative mirror
symmetry
Singularities

languages

Swedish (native)
English (fluent)
French (fluent)
German (intermediate)
Chinese (studying)
Japanese (beginner)
Polish (beginner)

Research Summary & Highlights

My work centers on **Arithmetic and Complex Algebraic Geometry**, focusing on Arakelov theory, singularity invariants, and connections to enumerative mirror symmetry. A primary contribution is the development of intersection theoretic methods in Arakelov geometry, including foundational work on the Deligne-Riemann-Roch isomorphism and BCOV invariants of Calabi–Yau manifolds. Future research will focus on applications of these techniques to open questions in the theory of singularities, related questions about moduli spaces, and enumerative geometry

Education

- 2003–2008 **PhD in Mathematics** Université d'Orsay, Paris 11, Paris
Thesis: Formule de Lefschetz fonctorielle et applications géométriques, under the supervision of Damian Rössler.
- 2000–2003 **Undergraduate and master studies in Mathematics** University of Gothenburg, Gothenburg + Paris 13, Paris
Thesis: Some more or less explicit class field theory. Under the supervision of Peter Hegarty.

Positions

- 2024–present **Professor (Gothenburg)** Chalmers University of Technology
Department of Mathematical Sciences.
- 2018–2023 **Associate Professor (Docent) (Gothenburg)** Chalmers University of Technology
Department of Mathematical Sciences.
- 2014–2018 **Assistant Professor (Gothenburg)** Chalmers University of Technology
- 2017 **Visitor MPI** Max Planck Institute for Mathematics, Bonn
January–April.
- 2014 **Junior Trimester Program (Organiser)** Hausdorff Institute for Mathematics
Trimester: Algebraic geometry (p -adic methods in Arakelov geometry and Shimura varieties).
- 2013 **Postdoctoral Researcher** Max Planck Institute for Mathematics
January–December.
- 2009–2012 **Postdoctoral Researcher** University of Gothenburg
Teaching assistant 2011–2012.
- 2008–2009 **Postdoctoral Researcher** University of Tokyo
- 2007–2008 **JSPS Research Fellow** University of Tokyo

Academic & Organizational Responsibilities

2018-2023	PhD Student Admissions Committee Member of the PhD committee deciding future PhD students.	Chalmers
2019–2023	Programme Board Member Member of the "Programråd" for Samhällsbyggnadsteknik.	Chalmers
2014	Group Leader (Junior Trimester Program) Organized and led the Junior Trimester Program: p -adic methods in Arakelov geometry and Shimura varieties.	Hausdorff Institute for Mathematics
2009–2020	High School Outreach Coordinator Contact person for high school research projects in mathematics.	Gothenburg region
2014–	Main Organizer / Co-Organizer (International Workshops) N-cube (2015, 2016, 2018, 2025); Freixit 2024; Number theory and dynamical systems (2016); Algebraic Geometry (Bonn, 2018); Workshop: Arithmetic intersection theory and Shimura varieties (2014).	International workshops
2010–	Thesis Committees & Examination Rapporteur for Dai Imai (Kyoto 2024); Rapporteur and Member of jury for Dorian ni (Paris 2022); Member of jury for Bertrand Duma (Paris 2012); Diskutant/Opponent at licentiate defense for Ida Säfström (Gothenburg 2010).	Paris and Gothenburg
2010–	**Professional Service and Journal Refereeing** Regular ad-hoc referee for journals including: Inventiones Mathematicae, IMRN, Algebra & Number Theory, Journal of Differential Geometry, JEMS, JHEP, JGP, Selecta Mathematica, and Pacific Journal of Mathematics. Also served as a referee for various international conference proceedings.	International Journals

Teaching and Pedagogical Work and Grants

2019, 2020, 2023	Teaching Award (Thrice Awarded) Won prize for best teacher in the Civil Engineering-program. In 2020 nominated for Chalmers pedagogical prize.	Chalmers
2024-present	Bachelor thesis examiner Examiner for bachelor theses in mathematics, about 80 students and 20 projects.	Chalmers and University of Gothenburg
2016–	Courses Taught Undergraduate: Pre-paratory Calculus; Calculus at Civil engineering-programme; Multivariable calculus. Master Level: Alg. geometry; Reading courses: alg. topology, homological algebra (upcoming). PhD Level: K -theory (with M. Goffeng); p -adic methods (with A. Södergren, S. Herrero); Reading courses in alg. number theory, Arakelov theory, Hodge theory, Derived geometry and GW-theory (upcoming).	Chalmers, Hangzhou, Paris
2016–	Supervision (PhD Students) Completed: Manh Hung Tran (defended 2020); Jiacheng Xia (2021, as co-supervisor); Mykola Pochekai (defended 2024); Current: Douglas Molin (2021-present, as co-supervisor), Gabriel Abánades Joglar (2025–present), Anthony Mäkelä (2025–present, as co-supervisor).	Chalmers
2016–	Supervision (Master and Bachelor Students) Master students: M. Lindby (2016), M. Fries (2020), R. A. Pop Gorea (2021), F. Frelot (2022), L. Xudong (2024), S. Jansson (current), S. Plumeyer (current). Bachelor project: "How do we know that a computer does what it says it does?" (2024).	Chalmers
2014-2018	Pedagogical Studies in Higher Education (15 hp, equivalent of half a year of full-time study) Formal qualification in university-level teaching and learning: covered teaching methods, student assessment, curriculum development, and learning theories.	Chalmers
2018?	Innovation grant Approx. €70.000, dedicated to developing digital teaching tools. I applied for and lead the endeavour.	Chalmers
2018	Pedagogical Research Publication Communicating to Learn Multivariable Calculus: Students' Blackboard Presentations as a Means for Enhancing Mathematics Learning. With Hans Malmström.	Primus 28 (2018), no. 8

Recent Selected Seminars

Dec, 2025	Algebraic geometry seminar (Upcoming) On smooth fillings of Calabi–Yau varieties	Bologna, Italy
March, 2025	Séminaire de géométrie "Anniversaire Paul 80" The spectral genus and an inequality for the Milnor number	Paris, France
March, 2024	Spring school in Arakelov Geometry and related topics Relative intersection theory and Arakelov geometry, minicourse	Hangzhou, China
April, 2024	Algebraic geometry seminar From counting genus one curves to questions about singularities	Stockholm, Sweden
Sep., 2023	Masterclass: Arakelov geometry on Shimura varieties Eisenstein series and enumerative geometry	Copenhagen, Denmark
2019–2021	Genus one mirror symmetry and the arithmetic Riemann–Roch theorem	Princeton, Marseille, Oxford, Stockholm

Selected Conferences

Sep., 2025	Kähler Geometry: Past, Present and Future On a conjecture of Deligne for the determinant of the cohomology	Banff, Canada
May, 2025	Hodge theory in a broad sense On smooth fillings of Calabi-Yau families	Stockholm, Sweden
Dec, 2024	Around Local Index Theory Intersection bundles and the Cappell–Miller torsion for Riemann surfaces. Mini-course on joint work with Gerard Freixas i Montplet.	Paris, France
Nov, 2024	Algebra and Friends Milnor Number Inequalities in Hypersurface Singularities	Borås, Sweden
May, 2024	Complex Geometry Workshop On some singularity invariants from analytic torsion	Aarhus, Denmark
Sep., 2021	Arakelov geometry intercity conference Genus one mirror symmetry and the arithmetic Riemann–Roch theorem	Regensburg, Germany
2019	Workshop Alkage On an invariant for Calabi-Yau manifolds through analytic torsion	Grenoble

Preprints and arXiv

2026?	Griffiths-Kato lines and K-equivalence With Gerard Freixas i Montplet and Lie Fu	in progress
2026?	A Durfee type inequality for higher rational singularities With Gerard Freixas i Montplet	in progress
2025	The Deligne-Riemann-Roch isomorphism With Gerard Freixas i Montplet. Sequel to Deligne-Riemann-Roch and intersection bundles (JEP 11 (2024)).	arXiv:2509.05077 [math.AG]
2024.	Genus one mirror symmetry for intersection of two cubics in \mathbb{P}^5 With Mykola Pocheikai. Pending revision	arXiv:2410.08897 [math.AG]

Select Significant Publications (Highlighted)

2024	Deligne-Riemann-Roch and intersection bundles With Gerard Freixas i Montplet.	J. Éc. polytech. Math. 11 (2024), 247–361
2022	On genus one mirror symmetry in higher dimensions and the BCOV conjectures With Gerard Freixas i Montplet, Christophe Mourougane.	Forum Math. Pi 10 (2022), e19
2021	BCOV invariants of Calabi--Yau manifolds and degenerations of Hodge structures 379–454 With Gerard Freixas i Montplet, Christophe Mourougane.	Duke Math. J. 170 (2021), no. 3,
2021	Spaces of norms, determinant of cohomology and Fekete points in non-Archimedean geometry (2021), 107501 With Sébastien Boucksom.	Adv. Math. 378
2015	A logarithmic interpretation of Edixhoven's jumps for Jacobians With Lars Halvard Halle, Johannes Nicaise.	Adv. Math. 279 (2015), 532–574

Complete List of Publications

to appear	Base change conductors through intersection theory and quotient singularities arXiv:2410.15370 [math.NT, math.AG] With Lars Halvard Halle, Johannes Nicaise. To appear in Documenta Mathematica.	
to appear	The spectral genus of an isolated hypersurface singularity and a conjecture relating to the Milnor number arXiv:2405.03450 [math.AG, math.CO, math.CV] With Gerard Freixas i Montplet. To appear in Documenta Mathematica.	
2024	Erratum to: Discriminants and Artin conductors	J. Reine Angew. Math. 814 (2024), 283–284
2022	On genus one mirror symmetry in higher dimensions and the BCOV conjectures With Gerard Freixas i Montplet, Christophe Mourougane.	Forum Math. Pi 10 (2022), e19
2021	Nonproper intersection products and generalized cycles With Mats Andersson, Håkan Samuelsson Kalm, Elizabeth Wulcan, Alain Yger.	Eur. J. Math. 7 (2021), no. 4, 1337–1381
2021	Global representation of Segre numbers by Monge--Ampère products With Mats Andersson, Håkan Samuelsson Kalm, Elizabeth Wulcan, Alain Yger.	Math. Ann. 380 (2021), no. 1–2, 349–391
2021	BCOV invariants of Calabi--Yau manifolds and degenerations of Hodge structures 379–454 With Gerard Freixas i Montplet, Christophe Mourougane.	Duke Math. J. 170 (2021), no. 3,
2021	Spaces of norms, determinant of cohomology and Fekete points in non-Archimedean geometry (2021), 107501 With Sébastien Boucksom.	Adv. Math. 378
2020	Kähler quantization of vortex moduli With Nuno M. Romão.	Lett. Math. Phys. 110 (2020), no. 4, 659–693
2018	Singularities of metrics on Hodge bundles and their topological invariants With Gerard Freixas i Montplet, Christophe Mourougane.	Algebr. Geom. 5 (2018), no. 6, 742–775
2016	Discriminants and Artin conductors	J. Reine Angew. Math. 712 (2016), 107–121
2015	A logarithmic interpretation of Edixhoven's jumps for Jacobians With Lars Halvard Halle, Johannes Nicaise.	Adv. Math. 279 (2015), 532–574
2013	Degenerating Riemann surfaces and the Quillen metric	Int. Math. Res. Not. IMRN 2013, no. 2, 347–361
2011	Galois theory and coverings With Ulf Persson.	Normat 59 (2011), no. 3–4, 178–191, 192
2009	Un isomorphisme de type Deligne-Riemann-Roch	C. R. Math. Acad. Sci. Paris 347 (2009), no. 19–20, 1115–1118
2008	On the Brauer-Manin obstruction for zero-cycles on curves With Victor Scharaschkin.	Acta Arith. 135 (2008), no. 2, 99–110

Some Select Research Grants

2026	Research in Paris 2 month invitation.	Institut Henri Poincaré
2025	Vergstiftelsen Postdoc Grant Grant, approx. €200,000, to hire a postdoc for two years, in the project "The hunt for new invariants in the intersection of arithmetic and algebraic".	Postdoc grant
2022–2025	Vetenskapsrådet Research Project Grant Approx. €350,000.	PI
2009–2011	Vetenskapsrådet Postdoc Grant Salary for two years.	PI
2024	G.S. Magnussons Grant Approx. €30,000.	mobility grant
2025	Svensk-Franska stifelsen Approx. €6,000.	mobility grant
2020	Knut och Alice Wallenberg Foundation For Gerard Freixas i Montplet, one year visiting professor at Chalmers.	Visiting Professor Grant
2018	Research in Paris Two-month funded visit.	Institut Henri Poincaré
2014	Trimester Program Organizer Group-leader for a trimester on the topic of " p -adic methods in Arakelov geometry and Shimura varieties".	HIM Bonn