

Eoin Mackall

eoinmackall@gmail.com

<https://eoinmackall.github.io>

Capitola CA.
(XXX) XXX-XXXX

Skills

Languages: Python, Julia, C/C++ (CUDA), SQL
HPC: Slurm Workload Manager, Multithreading, Distributed and Parallel Computing
Tooling: LaTeX, Git, Pandas, DuckDB, Nix and NixOS, Linux
Mathematics: Algebra and Algebraic Geometry, Number Theory, Algebraic Groups, Algorithms

Certificates

Nvidia Getting Started with Accelerated Computing in Modern CUDA C++

Education

2015-2019 Ph.D. in Mathematics
University of Alberta, Edmonton
2013-2015 B.A. in Mathematics, minor in Chemistry
California State University, Chico

Awards

2019 Anton Alexander Cseuz Gold Medal in Math
2019 Faculty of Science Dissertation Award
2017 UAlberta Graduate Student Teaching Award
2014 Undergraduate Research and Creativity Grant

Professional Experience

- International collaborator and researcher. Author of multiple peer-reviewed papers (12) and preprints (5) in algebra, algebraic geometry, K -theory, and number theory.
- Invited speaker at 20+ national and international seminars and conferences.
- Course developer and primary instructor for 20+ undergraduate and graduate mathematics courses.

Visiting Assistant Professor, UC Santa Cruz

(July 2024–Present)

- Collaborated with national and international research team on: “A looming of phantoms” with K. Kemboi, D. Krashen, T. Liu, Y. Liu, S. Makarova, A. Perry, A.A. Robotis, and S. Venkatesh. *ArXiv Preprint* <https://arxiv.org/abs/2511.05381>, 27 pages. *Associated Code* <https://github.com/eoinmackall/Phantoms>
 - Optimized high performance Gröbner basis algorithms for complex and finite cohomology calculations in both Julia and Macaulay2; generated scripts with Python
 - Implemented computations and collected data using Slurm managed HPC cluster
- Maintainer and developer for open source [FiniteVarietiesDB](#).
 - Designed and implemented high performance multithreaded Julia algorithms for collecting and processing large quantities of algebraic data (millions among more than 2^{56} polynomials) using DuckDB infrastructure
 - Ran and designed data collection for use on HPC clusters using Slurm workload manager
- Contributor to the open source computer algebra systems Oscar.jl and Hecke.jl.
 - Added object implementation for quaternion algebras in characteristic 2. Implemented in-place operations for elliptic curve arithmetic. Fixed functionality for calculating orders of torsion elements and bounds on torsion subgroups of elliptic curves.
 - Increased API documentation coverage and uniformized website design UI (Hecke.jl)
- Developed novel parallel algorithm for integer factorization, “A factorization algorithm based on Cohn’s irreducibility criterion”, 8 pages. Performed large scale data collection and analysis.
 - Implemented data collection algorithms in Julia and C (OpenMP), and data analysis scripts in Python.
 - Work in progress: <https://github.com/eoinmackall/CohnFactorization>
- Designed and introduced Python based data science initiatives (incorporating logistic regression and cryptographic methods) into UC Santa Cruz STEM undergraduate courses

Lecturer, UC San Diego

(July 2023–2024)

- Collaborated with national and international researchers on research articles in algebra, algebraic geometry, and arithmetic geometry: <https://arxiv.org/abs/2504.02728> and <https://arxiv.org/abs/2401.10493>
- Communicated complex technical concepts for diverse audiences of 600+ undergraduates

Sergei Novikov Postdoctoral Fellow, University of Maryland at College Park (July 2020–2023)

- Developed novel algorithm for producing torsion elements of Chow groups of Severi–Brauer varieties by reduction to computable linear algebraic structures over finite fields leading to publication “A universal coefficient theorem with applications to torsion in Chow groups of Severi–Brauer varieties”, *New York Journal of Mathematics*. Vol. 26 (2020), 1155–1183.
 - Compiled and tabulated data demonstrating novelty and producing first examples of generic behavior
- Communicated complex technical concepts for diverse audiences of undergraduate and graduate students
- Enabled undergraduate and graduate student research via direct mentoring and collaborative problem solving