

Astra Kolomatskaia (*she/her*)

✉ astra.kolomatskaia@gmail.com

📄 github.com/FrozenWinters

📺 youtube.com/astradiol

Education

Stony Brook University

Doctor of Philosophy

Doctoral Advisor: *Emily Riehl (Johns Hopkins)*

Concentration: *Homotopy Type Theory and Higher Category Theory*

STONY BROOK, NEW YORK

August 2018 – current

University of Cambridge

Master of Advanced Study in Pure Mathematics

CAMBRIDGE, CAMBRIDGESHIRE

October 2017 – June 2018

University of Waterloo

Bachelor of Mathematics in Honours Pure Mathematics

WATERLOO, ONTARIO

September 2013 – April 2017

With Distinction, Dean's Honours List

Publications and Preprints

Displayed Type Theory and Semi-Simplicial Types

Joint work with Michael Shulman, In Preparation

The Objective Metatheory of Simply Typed Lambda Calculus

In Preparation

An Infinite Quantum Ramsey Theorem

Joint work with Matthew Kennedy and Daniel Spiroak, J. Operator Theory Volume 84, Issue 1, pp. 49-65

Selected Talks

Semi-Simplicial Types

Homotopy Type Theory Electronic Seminar Talks (HoTTEST), 15 December 2022, [Recording Link](#)

The Objective Metatheory of Simply Typed Lambda Calculus

The New York City Category Theory Seminar, 2 November 2022, [Recording Link](#)

Selected Teaching

Note: *full recordings of all of the following courses are accessible from my YouTube channel*

HoTTEST Summer School 2022

Teaching assistant (by invitation) for a two thousand participant online summer school

Taught a full tract of Agda problem solving sessions and organised queer and neurodiverse meetups

MAT 250, Introduction to Advanced Mathematics, Stony Brook University

Sole instructor of an advanced-section introduction to proofs course

The course focused on programming in Racket and proof assistant implementation

MAT 303, Calculus IV, Stony Brook University

Sole instructor of an ordinary differential equations course

MAT 126, Calculus B, Stony Brook University

Sole instructor of a calculus course primarily covering integration techniques

Selected Code

Note: *all of the following open source projects may be found pinned on my GitHub profile*

`stlc`

Agda formalisation of the categorical logic of simply typed lambda calculus with an 'objective' proof of normalisation

`SbE`

Minimal redux of the `stlc` project to produce a Normalisation by Evaluation powered stepper

`SSTs`

Early work in progress on semi-simplicial types including a construction of singular semi-simplicial types in Agda

`trains`

A bare-metal development of a microkernel and real-time OS for controlling Märklin model trains

Joint work with Louis Burke for CS 452 at Waterloo

`xtensor`

Merged contributions to a `cpp` template meta-programming library as part of Google Summer of Code

Work Experience

State of New York

Teaching Assistant, Stony Brook University, Department of Mathematics
*Served as a teaching assistant for eight semesters, at two sections per term
Taught three summer courses*

STONY BROOK, NEW YORK

August 2018 – current

Nanotronics

Jr Software Development Associate

*Developed customer-facing data visualisation and statistical analysis tools
This was part of nSpec, a tool for performing scans and analyses of silicone wafers in microchip manufacturing*

BROOKLYN, NEW YORK

June – August 2023

Google Summer of Code

Student participant with CERN/HSF

*Worked on highly efficient and portable implementations of small matrix linear algebra primitives
The project summary may be found [here](#)*

REMOTE

June – August 2018

University of Waterloo

Undergraduate Research Assistant

*2015 - Worked on rational graph embeddings with Jim Geelen and David McKinnon
2016 - Worked on Banach spaces of analytic functions with Kenneth Davidson and Nico Spronk
2017 - Worked on quantum Ramsey theory with Matthew Kennedy*

WATERLOO, ONTARIO

May – August 2015, 2016, 2017

Selected Fellowships and Awards

NSERC Postgraduate Scholarships – Doctoral

\$63,000 CAD, August 2020 – August 2023

Computing Connections Fellowship

\$40,000 USD, December 2022

NSERC Undergraduate Student Research Award

\$4,500 CAD ($\times 2$), May – August 2015, 2016

NSERC Canada Graduate Scholarships – Doctoral

\$105,000 CAD, declined in 2020 as this was only tenable at a Canadian institution

NSERC Canada Graduate Scholarships – Master's

\$17,500 CAD, declined in 2018 to attend Stony Brook University instead of University of Toronto

Miscellaneous

International Collegiate Programming Contest (ICPC) Regionals

*Fourth (of sixty teams) in the 2018 Greater NY Regional with SBU-Ereshkigal
Helped with organising SBU team selection contests and training, 2019 – 2023*

HCSSiM and Canada/USA Mathcamp

Significant formative programs attended in high school

Basic Amateur Radio Operations Certification (Canada)

Call Sign: VA3MID