

Talia Lily Ringer (they/them)

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<https://dependenttyp.es>
<https://github.com/tlriger>

ACADEMIA

University of Illinois Urbana-Champaign 2021 – Present
Assistant Professor (4 YOE)

University of Washington 2015 – 2021
Ph.D. in Computer Science (advised by Dan Grossman).
Ph.D. Thesis: [Proof Repair. Defense video.](#)

University of Maryland, College Park 2008 – 2012
B.S. in Mathematics and Computer Science. (advised by Larry Washington).
Honors Thesis: [An Elliptic Curve Threshold Key Establishment Scheme](#)

INDUSTRY

Industrial Research (1 YOE)

Visiting Researcher, Google (N2Formal) Summer 2022 – Winter 2022
Research Scientist Intern, Amazon (Automated Reasoning Group) Summer 2016

- Worked on machine learning tools for proof assistants at Google.
- Developed a solver-aided language for automated test input generation at Amazon.

Software Engineering (4 YOE)

Software Development Engineer II, Amazon 2015
Software Development Engineer I, Amazon 2012 – 2014
Software Development Engineer Intern, Amazon Summer 2011
Software Intern, Carr Astronautics 2010 – 2011

- Helped launch [Amazon Business](#).
- Wrote customer-facing code used company-wide at Amazon.
- Deleted more lines of code during my time as an engineer at Amazon than I added. :)

INTERNATIONAL PROGRAMS FOUNDED

I am the **founder and president** of the [**Computing Connections Fellowship**](#), which provides institution-independent transitional funding and research visits for computer science Ph.D. students seeking healthier environments. Our two year pilot is in programming languages.

I am also the **founder and previous chair** of [**SIGPLAN-M**](#), a cross-institutional long-term mentoring program for the programming languages research community. It currently reaches more than **200 mentors** and **300 mentees** across more than **44 countries**, and has been described by mentees as “**life changing**” and “**a career saver**.”

My work founding these two programs (along with my other service work) led me to receive the **2023 ACM SIGPLAN Distinguished Service Award**.

RESEARCH IMPACT

My work introduced [proof repair](#), which has since been implemented and adapted at [Amazon](#) and [NASA](#), and was the subject of a [DARPA AI Exploration](#).

RESEARCH VISION

How can we build a world in which programmers of **all skill levels** across **all domains** can prove the absence of costly or dangerous bugs in software systems – that is, **formally verify** them? I lead a group that builds **proof engineering** technologies to make that world a reality. My group loves to use the whole toolbox – everything from **dependent type theory** to **program transformations** to **neural proof synthesis** – all in service of **real humans**.

CURRENT ADVISING

Ph.D. Students:

- [Chris Lam](#), 2021 – Present
- [Cosmo Viola](#), 2021 – Present
- [Hannah Leung](#), 2022 – Present
- [Trey Plante](#), 2025 – Present
- [Eric Paul](#), 2025 – Present
- [Jamie Fulford](#), 2025 – Present
- [Jasper Lee](#), 2025 – Present
- [Kevin Fisher](#), 2025 – Present

Researchers:

- [Evan Marzion](#), 2024 – Present

Masters Students:

- [Priyam Sahoo](#), 2024 – Present

PREVIOUS ADVISING

Postdoctoral Researchers

- [Kiran Gopinathan](#), 2024 – 2025

Ph.D. Students:

- [Dylan Zhang](#), 2022 – 2024

Visiting Ph.D. Students:

- [Jilin Hu](#), 2024 – 2025

Research Programmers:

- [Arpan Agrawal](#), 2022 – 2024

Masters Students:

- [Thomas Reichel](#), 2022 – 2024
 - Thesis: [Neural Approaches to Theorem Search and Proof Repair](#)

Undergraduates:

- **Eeshan Zele**, 2022 – 2024
- **Eyad Loutfi**, 2024 – 2025
- **Jasper Hugunin**, 2018 – 2019 (coadvised with Dan Grossman)
 - Thesis: [Constructing Inductive-Inductive Types in Cubical Type Theory](#)
- **Max Fan**, 2022 – 2024
 - Now at Cornell for Ph.D.
- **Sankar Gopalkrishna**, 2022 – 2025
- **Taylor Blau**, 2019 – 2020 (coadvised with Dan Grossman)
 - Thesis: [Verifying Strong Eventual Consistency in \$\delta\$ -CRDTs](#)
- **Timothy Zhou**, 2021 – 2024
 - Now at UCSD for Ph.D.
- **Zory Zhang**, 2023

DISSERTATION COMMITTEES

Bolton Bailey, UIUC, 2024. Formalizing Soundness Proofs of SNARKs.

Emily First, UMass Amherst, 2023. [Automating the Formal Verification of Software](#).

HONORS & AWARDS

ESEC/FSE Distinguished Paper Award	2023
DARPA Young Faculty Award	2023
ACM SIGPLAN Distinguished Service Award	2023
Amazon Research Award	2022
PEO Scholar Award	2020
NSF GRFP	2016

GRANTS AWARDED

VERSE: Verification Engineering for Real-World Software Engineers. DARPA [PROVERS](#), 2024. Primary PIs: Galois.

EPSULLM: Enabling Formal Methods Proof Synthesis Using Large Language Models. DARPA Seedling, 2024. PI: Yuriy Brun (UMass Amherst). Co-PI: **Talia Ringer** (UIUC).

Relation Learning for Proof Automation – PRICELESS. DARPA Young Faculty Award 2023. PI: **Talia Ringer** (UIUC).

PLATO: Enriched Tactic Prediction Models for Proof Synthesis & Repair. DARPA [PEARLS](#) AI Exploration. PI: **Talia Ringer** (UIUC). Co-PIs: Yuriy Brun (UMass Amherst) and Alex Sanchez-Stern (UMass Amherst).

POLYMORPH: Promotion to Optimal Languages Yielding Modular Operator-driven Replacements and Programmatic Hooks. DARPA [V-SPELLS](#). Primary PIs: Galois. Co-PIs: Northeastern, UW, UIUC, Alabama, and Syracuse.

Neurosymbolic Proof Synthesis and Repair. [Amazon Research Awards](#) 2022. PI: **Talia Ringer** (UIUC).

INVITED TALKS

Big Proof Indiana	2025
Big, Pretty Math Mechanization and Mathematical Research Workshop, Lorentz Center	2025
Bridging Neural and Symbolic Proof Automation <u>TYPES</u>	2024
Language Models for Formal Proof <u>Symposium on the Science of Security (HotSoS)</u> Keynote	2024
Proofs and Conversations UIUC Math Colloquium	2024
Concrete Problems in Proof Automation <u>AI for Theorem Proving (AITP)</u> , <u>EuroProofNet Large Libraries of Proofs</u>	2022
You and Your Environment Programming Languages Mentoring Workshop (PLMW) at POPL	2022
Proof Engineering Tools for a New Era Caltech, UCLA, UMass Amherst, Aarhus, Vermont, Illinois, Virginia, Tufts	2021
Proof Repair Across Type Equivalences Cornell, CMU, NUS	2020 – 2021
Proof Transformation <u>Logic Supergroup</u> Seminar Series	2020
Proof Engineering Tools for a New Era Rising Stars in CS Lecture Series at UMass Amherst	2019

INVITED SEMINARS AND WORKSHOPS

Lorentz Center Workshop Mechanization and Mathematical Research	<i>Fall 2025</i>
Shonan Seminar Foundation Models and Software Engineering: Challenges and Opportunities	<i>Spring 2024</i>
Dagstuhl Seminar Automated Mathematics: Integrating Proofs, Algorithms, and Data	<i>Fall 2023</i>
Career Path Panel Programming Languages Mentoring Workshop (PLMW) at PLDI	<i>Summer 2023</i>

NeurIPS Queer in AI Workshop: Queerness and Faculty Panel*Winter 2022*

Invited Panel

NeurIPS Workshop on MATH-AI*Winter 2022, 2023*

Invited Panel

ICML Workshop on Human-Machine Collaboration and Teaming*Summer 2022*

Invited Panel: Human-Machine Teams for Mathematicians

Dagstuhl Seminar*Canceled (COVID-19)*

Static Methods for Correctness of Model and Program Transformations

Coq Users and Developers Workshop*Summer 2018, 2019*

An Event for Understanding, Improving, and Extending Coq

Rising Stars*Fall 2019*

An Academic Career Workshop for Women in EECS

REFEREED CONFERENCE & JOURNAL PUBLICATIONS

Saketh Ram Kasibatla, Arpan Agarwal, Yuriy Brun, Sorin Lerner, Talia Ringer, Emily First.

[Cobblestone: Iterative Automation for Formal Verification.](#)

ICSE 2026.

Cosmo Viola, Max Fan, Talia Ringer.

[Proof Repair across Quotient Type Equivalences](#)

OPOSLA 2025.

Borhane Blili-Hamelin, Christopher Graziul, Leif Hancox-Li, Hananel Hazan, El-Mahdi El-Mhamdi, Avijit Ghosh, Katherine Heller, Jacob Metcalf, Fabricio Murai, Eryk Salvaggio, Andrew Smart, Todd Snider, Mariame Tighanimine, Talia Ringer*, Margaret Mitchell*, Shiri Dori-Hacohen*.

[Stop Treating ‘AGI’ as the North-Star Goal of AI Research.](#)

ICML 2025 (Position Track).

Alex Sanchez-Stern, Abhishek Varghese, Zhanna Kaufman, Dylan Zhang, Talia Ringer, Yuriy Brun.

[QEDCartographer: Automating Formal Verification Using Reward-Free Reinforcement Learning.](#)

ICSE 2025.

Audrey Seo*, Chris Lam*, Dan Grossman, Talia Ringer.

[Correctly Compiling Proofs About Programs Without Proving Compilers Correct.](#)

ITP 2024.

Talia Ringer.

[Proofs and Conversations.](#)

AMS Early Career Notices, October 2024.

Dylan Zhang, Curt Tigges, Zory Zhang, Stella Biderman, Maxim Raginsky, Talia Ringer.
[Transformer-Based Models Are Not Yet Perfect At Learning to Emulate Structural Recursion.](#)
TMLR 2024. [Short version.](#)

Emily First, Markus Rabe, Talia Ringer, Yuriy Brun.
[Baldur: Whole-Proof Generation and Repair with Large Language Models.](#)
ESEC/FSE 2023. **Distinguished Paper Award.**

Tom Reichel, R. Wesley Henderson, Andrew Touchet, Andrew Gardner*, Talia Ringer*.
[Proof Repair Infrastructure for Supervised Models: Building a Large Proof Repair Dataset.](#)
ITP 2023.

Alex Sanchez-Stern*, Emily First*, Timothy Zhou, Zhanna Kaufman, Yuriy Brun, Talia Ringer.
[Passport: Improving Automated Formal Verification Using Identifiers.](#)
TOPLAS Volume 45, Issue 2: No. 12, pp 1-30.
[Presented at PLDI 2023. Tool repository.](#)

Arpan Agrawal, Emily First, Zhanna Kaufman, Tom Reichel, Shizhuo Zhang, Timothy Zhou,
Alex Sanchez-Stern, Talia Ringer, Yuriy Brun.
[Proofster: Automated Formal Verification.](#)
ICSE Demo 2023. [Demo video](#), [tool website](#).

Emily Ruppel*, Sihang Liu*, Elba Garza, Sukyoung Ryu, Alexandra Silva, Talia Ringer.
[Long-Term Mentoring for Computer Science Researchers.](#)
Communications of the ACM (CACM): Volume 66: No. 5, pp 33-35. May 2023.

Talia Ringer, RanDair Porter, Nathaniel Yazdani, John Leo, Dan Grossman.
[Proof Repair Across Type Equivalences.](#)
PLDI 2021. [Talk video](#), PUMPKIN Pi [tool repository](#).

Talia Ringer, Alex Sanchez-Stern, Dan Grossman, Sorin Lerner.
[REPLICA: REPL Instrumentation for Coq Analysis.](#)
CPP 2020. [Talk video](#).

Talia Ringer, Karl Palmskog, Ilya Sergey, Milos Gligoric, Zachary Tatlock.
[QED at Large: A Survey of Engineering of Formally Verified Software.](#)
Foundations and Trends® in Programming Languages: Vol. 5: No. 2-3, pp 102-281. 2019.
[Project website](#).

Talia Ringer, Nathaniel Yazdani, John Leo, Dan Grossman.
[Ornaments for Proof Reuse in Coq.](#)
ITP 2019. [Talk video](#), DEVOID [tool repository](#).

Talia Ringer, Nathaniel Yazdani, John Leo, Dan Grossman.
[Adapting Proof Automation to Adapt Proofs.](#)
CPP 2018. [Talk video](#), PUMPKIN PATCH [tool repository](#).

Talia Ringer, Dan Grossman, Daniel Schwartz-Narbonne, Serdar Tasiran.
[A Solver-Aided Language for Test Input Generation](#).
OOPSLA 2017. [Talk video](#).

Talia Ringer, Dan Grossman, Franziska Roesner.
[AUDACIOUS: User-Driven Access Control with Unmodified Operating Systems](#).
CCS 2016. [Talk video](#).

WORKSHOP PUBLICATIONS

Tom Reichel, Talia Ringer.
[ProofDB: A Prototype Natural Language Coq Search Engine](#).
AITP 2024.

Dylan Zhang, Emily First, Talia Ringer.
[Getting More out of Large Language Models for Proofs](#).
AITP 2023.

Hannah Leung, Talia Ringer, Christopher Fletcher.
[Towards Formally Verified Path ORAM in Coq](#).
CoqPL 2023.

Seth Poulsen, Matthew West, Talia Ringer.
[Autogenerating Natural Language Proofs for Proof Education](#).
The Coq Workshop 2022.

PUBLICATION DRAFTS

Jilin Hu, Jianyu Zhang, Yongwang Zhao*, Talia Ringer*.
[HybridProver: Augmenting Theorem Proving with LLM-Driven Proof Synthesis and Refinement](#).
Under Submission.

LEADERSHIP, DIVERSITY, & SERVICE

Service is a core part of my career since it is **so much bigger than my own research**. My service was recognized with the **2023 ACM SIGPLAN Distinguished Service Award**.

International Programs Founded:

- | | |
|--|----------------|
| • <u>Computing Connections Fellowship</u> , Founder & President | 2022 – Present |
| • <u>SIGPLAN-M</u> (long-term mentoring), Founder & Previous Chair | 2021 – Present |

Conferences & Workshops:

- | | |
|---|------|
| • Beyond Bayes Workshop Co-Chair | 2022 |
| • Coq Workshop Co-Chair | 2022 |
| • SPLASH Hybridization Committee (<u>first major hybrid conference in my field</u>) | 2021 |
| • ICFP Programming Languages Mentoring Workshop (PLMW) Co-Chair | 2020 |
| • ICFP Mentoring Chair | 2020 |
| • <u>POPLmark 15 Year Retrospective Panel</u> Lead Organizer | 2020 |
| • Shut Down PL Co-Organizer (anti-racist workshop) | 2020 |

- DeepSpec Summer School Student Talks Organizer 2017

Departmental & University Service:

- Disability Justice Panel 2023
- Grainger [IDEA Institute](#) Core Faculty Member 2022 – 2024
- UW CSE Academic Jobs Panel 2022
- Illinois CS BPC Committee 2022 – 2023
- Illinois Mental Health Ambassador 2021 – Present
- Illinois [CS CARES](#) Committee 2021 – Present
- UW CSE Care Committee Founder & Organizer (support network) 2019 – 2021
- UW CSE Graduate Admissions Committee 2018

National & International Service:

- ACM SIGPLAN Distinguished Service Award Committee 2025
- BIRS Scientific Advisory Committee 2023 – Present
- BIRS Equity, Diversity, and Inclusion Advisory Committee 2023 – Present
- NASEM [AI to Assist Mathematical Reasoning Workshop](#) Planning Committee 2023
 - [Resources Document](#)
- [C3E Workshop](#) Planning Committee 2023

Reviewing & Program Committees (PCs):

- **Panels:** NSF (2023).
- **Conference PCs:** CPP (2026), POPL (2024), ICFP (2023), ITP (2022, 2026), PLDI (2022, 2026), CAV (2021).
- **Journal Reviewing:** Nature (2023, 2025), [JAR](#) (2022), Mathematical Structures in Computer Science (2020).
- **Workshop PCs:** TYPES (2022), AIPLANS (2021), HATRA (2020), CoqPL/RocqPL (2019, 2026).
- **Artifact Evaluation Committees:** CAV (2019), POPL (2018, 2019).

Mentoring:

- Mentor for [SIGPLAN-M](#), the program that I founded and chair. 2021 – Present
- Mentor for undergraduate and graduate women in CS at UW. 2015 – 2020
- Mentor for LGBT students through the UW Queer Mentoring Program. 2016 – 2019
- Technical and career mentor for software engineers at Amazon. 2012 – 2015

Community:

- Creator and administrator of the Neurodivergent at UIUC Slack (2022 – Present).
- Creator and administrator of the Neurodivergent in CS Slack (2021 – Present).
- Creator and administrator of the Midwest PL Slack (2021 – Present).
- Packer and food delivery driver for food banks in Seattle (2020 – 2021).
- ESL tutor & friendly visitor for an elderly refugee with JFS (2017 – 2021).
- Author of a [blog interview series](#) about LGBT CS researchers (2016 – 2018).

TEACHING

- [CS 598 TLR: Build your own Proof Assistant](#)**
[CS 576 TLR: Formalized Mathematics](#)
[CS 576 TLR: Dependent Type Theory](#)

Spring 2026
Fall 2025
Spring 2024

MEDIA

[**AI Through the Lens of Journalism**](#)

Live radio interview for The 21st Show.

[**AI-Powered Proof Generator Helps Debug Software**](#)

IEEE Spectrum article about our award-winning work on Baldur.

[**Talia Ringer receives DARPA Young Faculty Award**](#)

Article about receiving the DARPA Young Faculty Award.

[**Ringer Awarded for Mentoring and Community Work**](#)

Article about receiving the SIGPLAN Distinguished Service Award.

[**Formal Verification and Deep Learning**](#)

Podcast interview for The Gradient about my work as it intersects with machine learning.

[**Ringer Seeks to Expand Upon the Impact of Being a Mentor**](#)

Article about my international service work.

[**Proof Repair**](#)

Thesis Review podcast about my thesis work and how it has informed my work since.

[**Tenure, Sexism, and ADHD**](#)

Type Theory Forall podcast about my work and my experiences.

[**How Will Proof Engineering Affect the Future of Software Development?**](#)

A podcast interview about my work and future vision. From DevDiscuss Season 6, Episode 4.

[**Proof Repair & Code Generation**](#)

A Galois blog post by Valentin Robert about using my tools for industrial applications.

[**Proof Engineering for the People**](#)

A podcast interview about my work and future vision. From Building Better Systems.

[**AMA on Mentoring**](#)

Invited Ask Me Anything (AMA) session at ICFP 2021 about SIGPLAN-M.

[**GAP Interview**](#)

Interview about the academic job search.

JUST FOR FUN

I have an **amazing daughter** named Sarah Rose El-Kebir. I love her more than I could have ever imagined, and she takes up most of my time outside of work these days.

Before Sarah, I used to spend a lot of time playing **judo**. I was fairly new to it, but hooked.

Before that, I used to compete for **Club Northwest**, a top **distance running** club in Seattle. I served on the board of Club Northwest from 2015 to 2016. I ran **NCAA Division I Cross-Country** in 2009. And before even that, I was a **competitive swimmer** for ten years.

I also enjoy **roasting coffee, solving logic and number puzzles, writing poetry, singing, studying languages, making bagels, making chocolate truffles, windsurfing, playing Dance Dance Revolution, foraging edible mushrooms, and composing piano music**.