

## Talia Lily Ringer (they/them)

4218 Siebel Center for CS  
[tringer@illinois.edu](mailto:tringer@illinois.edu)

<https://dependtyp.es>  
<https://github.com/tlringer>

### ACADEMIA

**University of Illinois Urbana-Champaign** 2021 – Present  
**Assistant Professor (2.5 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

Dependent Type Theory and Proof Repair:

**Cosmo Viola** (Ph.D., 2021 – Present)

[Max Fan](#) (undergraduate, 2022 – Present)

Proof Compilation:

[Chris Lam](#) (Ph.D., 2021 – Present)

Verified Secure Computer Architectures (with Christopher Fletcher):

[Hannah Leung](#) (Ph.D., 2022 – Present)

**Eeshan Zele** (undergraduate, 2022 – Present)

**Sankar Gopalkrishna** (undergraduate, 2022 – Present)

Learning Semantic Relations (with Maxim Raginsky):

**Dylan Zhang** (Ph.D., 2022 – Present)

**Zory Zhang** (undergraduate, 2023 – Present)

Machine Learning for Proofs:

**Arpan Agrawal** (visiting research programmer, 2022 – Present)

**Thomas Reichel** (masters student, 2022 – Present)

[Timothy Zhou](#) (undergraduate, 2021 – Present)

## STUDENTS ADVISED

Taylor Blau (undergraduate, coadvised with Dan Grossman, 2019 – 2020)

[Verifying Strong Eventual Consistency in  \$\delta\$ -CRDTs](#) (senior thesis)

Jasper Hugunin (undergraduate, coadvised with Dan Grossman, 2018 – 2019)

[Constructing Inductive-Inductive Types in Cubical Type Theory](#) (FOSSACS 2019)

## DISSERTATION COMMITTEES

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

**Relation Learning for Proof Automation – PRICELESS.** DARPA Young Faculty Award 2023. PI: **Talia Ringer** (UIUC). Budget: \$500,000.

**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). Budget: \$1,000,000.

**POLYMORPH: Promotion to Optimal Languages Yielding Modular Operator-driven Replacements and Programmatic Hooks.** DARPA [V-SPILLS](#). Primary PIs: Galois. Co-PIs: Northeastern, UW, UIUC, Alabama, and Syracuse. Budget: \$11,342,650.

**Neurosymbolic Proof Synthesis & Repair.** [Amazon Research Awards](#) 2022. PI: **Talia Ringer** (UIUC). Budget: \$40,000.

## INVITED TALKS

<b>Proofs and Conversations</b> UIUC Math Colloquium	2024
<b><a href="#">Concrete Problems in Proof Automation</a></b> <a href="#">AI for Theorem Proving</a> (AITP), <a href="#">EuroProofNet Large Libraries of Proofs</a>	2022
<b>You and Your Environment</b> Programming Languages Mentoring Workshop (PLMW) at POPL	2022
<b>Proof Engineering Tools for a New Era</b> Caltech, UCLA, UMass Amherst, Aarhus, Vermont, Illinois, Virginia, Tufts	2021
<b>Proof Repair Across Type Equivalences</b> Cornell, CMU, NUS	2020 – 2021
<b><a href="#">Proof Transformation</a></b> <a href="#">Logic Supergroup</a> Seminar Series	2020
<b>Proof Engineering Tools for a New Era</b> Rising Stars in CS Lecture Series at UMass Amherst	2019

## INVITED SEMINARS AND WORKSHOPS

<b>Dagstuhl Seminar</b> Automated Mathematics: Integrating Proofs, Algorithms, and Data	<i>Fall 2023</i>
<b>Career Path Panel</b> Programming Languages Mentoring Workshop (PLMW) at PLDI	<i>Summer 2023</i>
<b>NeurIPS Queer in AI Workshop: Queerness and Faculty Panel</b> Invited Panel	<i>Winter 2022</i>
<b>NeurIPS Workshop on MATH-AI</b> Invited Panel	<i>Winter 2022, 2023</i>
<b>ICML Workshop on Human-Machine Collaboration and Teaming</b> Invited Panel: Human-Machine Teams for Mathematicians	<i>Summer 2022</i>
<b>Dagstuhl Seminar</b> Static Methods for Correctness of Model and Program Transformations	<i>Canceled (COVID-19)</i>
<b>Coq Users and Developers Workshop</b> An Event for Understanding, Improving, and Extending Coq	<i>Summer 2018, 2019</i>
<b>Rising Stars</b> An Academic Career Workshop for Women in EECS	<i>Fall 2019</i>

## REFEREED CONFERENCE & JOURNAL PUBLICATIONS

- 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

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

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.](#)  
Under Submission. [Short version](#).

Cosmo Viola, Max Fan, Talia Ringer.  
[Proof Repair across Quotient Type Equivalences](#)  
Under Submission.

Audrey Seo\*, Chris Lam\*, Dan Grossman, Talia Ringer.  
[Correctly Compiling Proofs About Programs Without Proving Compilers Correct.](#)  
Under Submission.

## LEADERSHIP, DIVERSITY, & SERVICE

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

### International Programs Founded:

- [Computing Connections Fellowship](#), Founder & President 2022 – Present
- [SIGPLAN-M](#) (long-term mentoring), Founder & Previous Chair 2021 – Present

### Conferences & Workshops:

- Beyond Bayes Workshop Co-Chair 2022
- Coq Workshop Co-Chair 2022
- SPLASH Hybridization Committee ([first major hybrid conference in my field](#)) 2021
- ICFP Programming Languages Mentoring Workshop (PLMW) Co-Chair 2020
- ICFP Mentoring Chair 2020
- [POPLmark 15 Year Retrospective Panel](#) 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 – Present
- 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:

- BIRS Scientific Advisory Committee 2023
- BIRS Equity, Diversity, and Inclusion Advisory Committee 2023
- NASEM [AI to Assist Mathematical Reasoning Workshop](#) Planning Committee 2023
- [C3E Workshop](#) Planning Committee 2023

### Reviewing & Program Committees (PCs):

- **Panels:** NSF (2023).
- **Conference PCs:** POPL (2024), ICFP (2023), ITP (2022), PLDI (2022), CAV (2021).
- **Journal Reviewing:** Nature (2023), [JAR](#) (2022), Mathematical Structures in Computer

Science (2020).

- **Workshop PCs:** TYPES (2022), AIPLANS (2021), HATRA (2020), CoqPL (2019).
- **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 576 TLR: Dependent Type Theory**

*Spring 2024*

**CS 421: Programming Languages and Compilers**

*Fall 2023*

**CS 598 TLR: Proof Automation**

*Spring 2022, Fall 2022*

## **MEDIA**

### **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 love **judo**. I am just a yellow belt, but I am hooked. My [home dojo](#) (**Kokushi Midwest Judo**) is fantastic. I find judo really amazing for clearing my mind, staying fit, and making friends.

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 **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 music for the piano**.