

# Curriculum Vitae: Sarah Ann Scheffler

## CONTACT INFORMATION

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## POSITIONS HELD

### Carnegie Mellon University

#### Assistant Professor

Software and Societal Systems (School of Computer Science, 50% joint appointment)

Engineering and Public Policy (College of Engineering, 50% joint appointment)

(Upcoming) Begins in September 2024

### Massachusetts Institute of Technology

#### Postdoctoral Associate

Internet Policy Research Initiative

September 2023 - Present

### Princeton University

#### Postdoctoral Research Associate

Center for Information Technology Policy

September 2021 - August 2023

## EDUCATION

### Boston University

#### Ph.D. in Computer Science

Advisor: Prof. Mayank Varia

Thesis: Decrypting Legal Dilemmas

Computer Science Research Excellence Award

September 2016 - June 2021

### Harvey Mudd College

#### B.S. joint in Computer Science and Mathematics

Departmental Honors in Computer Science

Graduated with Distinction

Concentration (“minor”) in Political Science

September 2011 - May 2015

## PUBLICATIONS

- [1] S. Scheffler, A. Kulshrestha, J. Mayer.  
*Public Verification for Private Hash Matching*  
Forthcoming at IEEE Security & Privacy (IEEE S&P) 2023.  
<https://ia.cr/2023/029>.
- [2] S. Scheffler, J. Mayer.  
*Systematization of Knowledge: Content Moderation for End-to-End Encryption*.  
Forthcoming at Privacy Enhancing Technologies Symposium (PETS) 2023.  
<https://arxiv.org/abs/2303.03979>.
- [3] A. Cohen, S. Scheffler, M. Varia.  
*Can the government compel decryption? Don't trust — verify*.

In ACM Symposium on Computer Science and Law (ACM CS&Law) 2022.  
<https://arxiv.org/abs/2208.02905>.

- [4] S. Scheffler, E. Tromer, M. Varia.  
*Formalizing Human Ingenuity: A Quantitative Framework for Copyright Law's Substantial Similarity*.  
In ACM Symposium on Computer Science and Law (ACM CS&Law) 2022.  
<https://arxiv.org/pdf/2206.01230>.
- [5] Y. Gvili, J. Ha, S. Scheffler, M. Varia, Z. Yang, X. Zhang.  
*TurboIKOS: Improved Non-interactive Zero Knowledge with Sublinear Memory*.  
In Applied Cryptography and Network Security (ACNS) 2021. (Acceptance rate: 19.9%)  
<https://ia.cr/2021/478>.
- [6] Y. Gvili, S. Scheffler, M. Varia.  
*BooLigero: Improved Sublinear Zero Knowledge Proofs for Boolean Circuits*.  
In Financial Crypto (FC) 2021. (Acceptance rate: 24.2%)  
<https://ia.cr/2021/121>.
- [7] S. Scheffler M. Varia.  
*Protecting Cryptography against Compelled Self-Incrimination*.  
In USENIX Security 2021. (Acceptance rate: 18.7%)  
<https://ia.cr/2020/862>.
- [8] T. Morrison, S. Scheffler, B. Pal, A. Viand.  
*Private Outsourced Translation for Medical Data*.  
Book chapter in "Protecting Privacy through Homomorphic Encryption" (2021), pp. 107-116.  
[https://link.springer.com/chapter/10.1007/978-3-030-77287-1\\_7](https://link.springer.com/chapter/10.1007/978-3-030-77287-1_7).
- [9] L. Alcock, S. Asif, J. Bosboom, J. Brunner, C. Chen, E. Demaine, R. Epstein, A. Hesterberg, L. Hirschfeld, W. Hu, J. Lynch, S. Scheffler, L. Zhang.  
*Arithmetic Expression Construction*.  
In International Symposium on Algorithms and Computation 2020. (Acceptance rate: 31.2%)  
<https://arxiv.org/abs/2011.11767>.
- [10] J. Ani, S. Asif, E. Demaine, Y. Diomidov, D. Hendrickson, J. Lynch, S. Scheffler, A. Suhl.  
*PSPACE-completeness of Pulling Blocks to Reach a Goal*.  
In the Journal of Information Processing 2020.  
[https://www.jstage.jst.go.jp/article/ipsjjip/28/0/28\\_929/\\_pdf](https://www.jstage.jst.go.jp/article/ipsjjip/28/0/28_929/_pdf).
- [11] J. Milligan, S. Scheffler, A. Sellars, T. Tiwari, A. Trachtenberg, M. Varia.  
*Case Study: Disclosure of Indirect Device Fingerprinting in Privacy Policies*.  
In Socio-Technical Aspects of Security 2019.  
<https://arxiv.org/abs/1908.07965>.
- [12] J. Ani, S. Asif, E. Demaine, Y. Diomidov, D. Hendrickson, J. Lynch, S. Scheffler, A. Suhl.  
*PSPACE-completeness of Pulling Blocks to Reach a Goal*.  
In the Japan Conference on Discrete and Computational Geometry, Graphs, and Games 2019.
- [13] R. Canetti, A. Cohen, N. Dikkala, G. Ramnarayan, S. Scheffler, A. Smith.  
*From Soft Classifiers to Hard Decisions: How fair can we be?*.  
ACM Fairness, Accountability, and Transparency 2019. (Acceptance rate: 24%)  
<https://arxiv.org/abs/1810.02003>.
- [14] S. Scheffler, S. Smith, Y. Gilad, S. Goldberg.  
*The Unintended Consequences of Email Spam Prevention*.  
In International Conference on Passive and Active Network Measurement 2018. (Acceptance rate: 40%)  
[https://link.springer.com/chapter/10.1007/978-3-319-76481-8\\_12](https://link.springer.com/chapter/10.1007/978-3-319-76481-8_12).

## MANUSCRIPTS

- [15] S. Scheffler, J. Ostling.  
*Dismantling False Assumptions about Autonomous Weapon Systems.*  
Manuscript.  
Won 2nd place in the Student Paper Competition at the ACM CSLaw Student Paper Competition in 2019.  
[https://sarahscheffler.net/Autonomous\\_Weapons\\_False\\_Assumptions.pdf](https://sarahscheffler.net/Autonomous_Weapons_False_Assumptions.pdf).
- [16] J. Hennessey, S. Scheffler, M. Varia.  
*On Resilient Password-Based Key Derivation Functions.*  
Manuscript.  
<https://sarahscheffler.net/diskcrypt/draft-2018-bog.pdf>.

## HONORS, AWARDS, AND FELLOWSHIPS

Google Ph.D. Fellowship (supported my Ph.D. research 2019-2021)  
Clare Boothe Luce Graduate Fellowship (supported my Ph.D. research 2017-2019)  
Boston University Computer Science Research Excellence Award (2021)  
RSA Conference Security Scholar (2020)  
ACM CSLaw Student Paper Competition: 2nd Place (2019)  
Clinic Team Award, HMC Computer Science Department (2015, awarded for an exceptional capstone project)  
International Mathematical Competition in Modeling: Meritorious Winner (2014), Honorable Mention (2015)

## INVITED TALKS

Cornell Security Seminar (April, 2023)  
EPFL SPRING Lab Seminar (November, 2022)  
Stanford Security Lunch (November, 2022)  
Microsoft Research Cryptography and Privacy Colloquium (November, 2022)  
ACM CS/Law (November, 2022)  
Rutgers Seminar for the REU Summer Program at DIMACS for Mathematics and Computer Science (June, 2022)  
DIMACS Workshop on the Co-Development of Computer Science and Law (May, 2022)  
CS+Law Research Presentations through Northwestern University (May, 2022)  
USENIX Security (Aug. 2021)  
Privacy Law Scholars Conference (June 2021)  
Cryptic Commons Workshop (May 2021)  
Georgetown Data Co-Ops Meeting (Mar. 2021)  
Duke Privacy and Security Seminar (Mar. 2021)  
Stanford Security Seminar (Feb. 2021)  
Berkeley Cryptography Seminar (Jan. 2021)  
Winter Security Seminar Series at Carnegie Mellon University (Jan. 2021)  
Real World Crypto (Jan. 2021)  
MIT Security Seminar (Dec. 2020)  
Guest lecturer at ETH Zurich course “Approaches to Authentication and Security: Views from Law, Economics, and the Scientific Disciplines” (Nov. 2020)  
Northeastern Privacy Scholars Workshop (Nov. 2020)  
DIMACS Workshop on the Co-Development of Computer Science and Law (Nov. 2020)  
Boston University Security Seminar (Oct. 2020)  
Cybersecurity Law and Policy Scholars Conference (planned Apr. 2020, two papers accepted for discussion, event postponed to Dec. 2020 due to COVID-19)  
Bridging Privacy seminar at Berkman Klein Center for Internet and Society (Dec. 2019)  
Cornell Crypto Seminar (Nov. 2019)  
Carnegie Mellon University AI Seminar (Oct. 2019)  
Boston University CyberAlliance Seminar (Dec. 2018)

## PROGRAM COMMITTEES

### Program Committee:

USENIX Security 2023

ACM Conference on Fairness, Accountability, and Transparency (ACM FAccT) 2023

Workshop on Foundations of Computer Security 2023, 2021

### Shadow Program Committee:

IEEE S&P 2020

### External Reviewer:

USENIX Security 2022

IEEE Security & Privacy 2021

ISCA Symposium on Security and Privacy in Speech Communication 2021

Theory of Cryptography Conference 2020

Eurocrypt 2020

IEEE Security & Privacy 2020

ACM Conference on Fairness, Accountability, and Transparency 2020

IEEE Computer Security Foundations Symposium 2018

International Conference on Cryptology and Network Security 2017

International Conference on Information Theoretic Security 2016

## HIGH SCHOOL OUTREACH

**RACECAR Crash Course:** From Oct. 2018 - Jan. 2019, volunteered as a teaching assistant for this program to prepare high school students for the Beaver Works Summer Institute RACECAR course in the summer.

**Code Creative:** From Jan. 2017 - Jan. 2018, was a mentor for Code Creative, a computer science education program for Boston-area high school students who do not have access to a computer science course at their schools. Was responsible for creating slides and labs, lecturing, organizing, and in-class tutoring. <https://www.codecreative-ll.org/>

**Codebreakers:** In summer 2016, as one of a team of three, created and taught a summer cybersecurity class for high school girls. Was responsible for creating the curriculum, creating class material and exercises, and leading classes. In 2017, 2018, and 2019, was a guest lecturer. <https://www.bu.edu/lernet/cyber/>

## TEACHING EXPERIENCE

**Teaching Fellow:** Applied Cryptography, Boston University Computer Science Department (Spring 2018, Spring 2017)

**Head Grader:** Linear Algebra (2013) and Differential Equations (2013), HMC Department of Mathematics

**Tutor/Grader:** Programming Languages (2014) and Principles of Computer Science (2013) and Intro to Computer Science (2013), HMC Computer Science Department

**Grader:** Multivariable Calculus (2013) and Calculus (2012) and Probability and Statistics (2012), HMC Department of Mathematics

## WORK EXPERIENCE

### Assistant Staff

MIT Lincoln Laboratory

Sep. 2015 - June 2016

Worked in the Secure and Resilient Systems and Technology group within the Cybersecurity and Information Sciences division. Assisted in the implementation and testing of a library that adds confidentiality and integrity guarantees to the Accumulo database, protecting it against a malicious server or sysadmin.

### Implementing Oblivious RAM

MIT Lincoln Laboratory

Summer 2015

Designed and implemented an Oblivious RAM for the Accumulo database in Java, to hide a querying client's access patterns from a malicious server as part of a larger project within the Secure and Resilient Systems and Technology group.

## **Quantifying Latent Fingerprint Quality**

The MITRE Corporation and HMC

Fall 2014 - Spring 2015

Worked on a team of four students to design, implement, and test a system that uses image processing and machine learning techniques to evaluate the suitability of crime scene fingerprint images for identification by Automated Fingerprint Identification Systems.

## **Statistical Testing of Cryptographic Entropy Sources**

NIST

Summer 2014

Worked with Dr. Allen Roginsky in the Computer Security Division of the National Institute of Standards and Technology (NIST) to improve NIST's statistical tests for entropy sources in cryptographic random number generators. Also made adjustments to the process for generating large primes for cryptography.

## **ARTICLES AND BLOG POSTS**

### **Cyber Alliance Blog:**

(Fewer Than) Five Reasons the Tech Sector Isn't All That Different (Feb 2018)

Google Has Its Fingers In Many Pies, But Isn't Monopolizing Any Individual Pie (July 2018)

Computers are Poor Decision-Makers for Ill-Defined Problems (Aug 2018)

The Skeletons in My Closet Are Styrofoam But It's Really None Of Your Business (Sep 2018)

### **The Conversation:**

Artificial intelligence must know when to ask for human help (Mar 2019)

### **Interviews and posts about my work:**

(Written about my work on the Cyber Alliance Blog) Could math change the law? What the 5th Amendment means in cryptography (Mar 2021)

(Interview with me on the Cyber Alliance Blog) Security vs Privacy – Why should you have to choose on messaging apps? (Mar 2021)

## **COMPUTER SKILLS**

**Programming:** Rust, Python, C++, C, Haskell, Java, Prolog

**Software and Frameworks:** NTL, SCALE-MAMBA (SPDZ-2), Mathematica, Sage, R, Matlab, L<sup>A</sup>T<sub>E</sub>X