Academic CV

Personal Data

Name	**DI Dr. Sophie Rain**
Birthday	05 August 1996
Email	sophie.rain@gmx.at
Homepage	sophierain.github.io
Languages	German (native)
	English (excellent)
	French (intermediate)
	Spanish (elementary)
Interests	various types of sports, languages, travelling

Research Interests

Logic, Security of Blockchain Applications, Game Theory, Automated Reasoning, Formal Methods

Academic Qualification

PhD

October 2020 – June 2025 student of SecInt Doctoral College and University Assistant at the Institute of Logic and Computation (TU Wien).

- supervised by Laura Kovacs
- working in Laura Kovacs' Automated Reasoning group (Formal Methods)
- focus on verifying game-theoretical security properties of distributed protocols. Developing Checkmate, a tool for automated game-theoretic security analysis.
- Co-founded the „Abenteuer Informatik für Volksschule" workshops, that are now run by TUWien Informatics' eduLAB.

Bachelor and Master

From October 2014 until June 2020 student of Mathematics at TU Wien.

Bachelor (2014-2018)
- discovered interest in Logic and formal theorem proving in the first semesters
- very good background knowledge on proofs
- graduated with highest distinction

Bachelor Thesis
- in the area of NLP, based on the i2b2 medication extraction challenge

Master (2018-2020)

- focus on computer science: Automated Deduction, Machine Learning, Logic
- also during term abroad at University of Waterloo, Canada
- Summer School on SAT, SMT and AR in Lisbon 2019
- BEST course on IoT, Aalborg, Denmark, August 2019
- ATHENS course on Data Transfer in Paris, November 2019
- graduated with highest distinction

Master Thesis
- on „First-Order Reasoning with Aggregates", motivated by verification of Smart Contracts
- encoding sums in First-Order logic and reasoning about it
- Institute of Logic and Computation, supervised by Laura Kovacs, in collaboration with Mooly Sagiv from Tel Aviv University

Professional Experience

Since August 2025	Contractor for the **Argot Collective**, as **Formal Verification** scientist. Continuing the work on game-theoretic security
February 2024 – June 2025	Part-time contractor of the **Ethereum Foundation** as **Formal Verification** scientist
October 2020 – June 2025	**University Assistent** at **TU Wien** in the course of my Phd studies
Sepember – November 2023	**Internship** with the **Ethereum Foundation** connecting my PhD research with Ethereum's smart contracts
September - December 2021	**Applied Science Intern** at **Amazon Web Services (AWS)** using Automated Reasoning to make AWS's services secure
February 2021	IPMA Level D certified Project Manager
October 2019 - August 2020	**Process Engineer** at **BOSCH** working in an international agile team in the area of integration testing of BOSCH control unit software, while in parallel finishing my master's degree
2015 - 2019	several **long term internships** at **BOSCH** supporting the customer project teams in terms of software testing
Summers 2014, 2012	summer **internships** at **Polymun** and **TGB**
School Year 2012/13	**CEO** of the **Junior Company** Hasta la Pasta in High School

Teaching

Winter Term 2024, Summer Term 2025	**Master Thesis Co-Supervision** of Ivana Bocevska
Winter Term 2023, Summer Term 2023	Advising **Projects in Computer Science** of Ivana Bocevska (received the Siemens Award for Excellence)
Summer Term 2022	**Master Thesis Co-Supervision** of Lea Brugger (received the Young Distinguished Alumn Award and the City of Vienna Diploma Thesis Prize).
Winter Term 2024, Winter Term 2022, Summer Term 2022, Summer Term 2021, Winter Term 2020	**Teaching Assistant** for Formal Methods in Informatics (mandatory Computer Science Master course)
Summer Term 2017	**Tutor** for Computer Mathematics (mandatory Mathematics Bachelor course)
Winter Term 2016	**Tutor** for Introduction to Programming (mandatory Mathematics Bachelor course)

Awards and Stipends

- **Best Presentation Award** at LPAR 2024
- Listed as one of **TU Wien's 30 under 30**, July 2023
- **Netidee Stipend** for my PhD project (November 2022 – May 2024)
- **Christiana Hörbiger Prize** for the mobility of junior researchers (October 2022)
- **Dr. Maria Schaumayer prize** for excellent master theses (October 2021)
- Stipend for **Excellent Students** 2018, 2019, 2020
- **VERBUND Frauenstipendium** 2016 (stipend to support outstanding young women in technical studies)

Publications

S. Rain,, A. Petković-Komel, M. Rawson, L. Kovács. **„Game Modeling of Blockchain Protocols"**, iFM 2025 (to appear)

I. Bocevska, A. Petković Komel, L. Kovács, S. Rain, M. Rawson. **„Divide and Conquer: A Compositional Approach to Game-Theoretic Security"**, OOPSLA 2025 (to appear)

S. Rain. **„Automated Security Analysis of Blockchain Protocols"**, Dissertation 2025

S.Rain, L. Brugger, A. Petković-Komel, L. Kovács, M. Rawson. **„Scaling CheckMate for Game-Theoretic Security"**, LPAR 2024

L. Brugger, L. Kovács, A. Petković-Komel, S. Rain, M. Rawson, **„CheckMate: Automated Game-Theoretic Security Reasoning"**, CCS 2023

M. Landman, S. Rain, L. Kovács, G. Futschek, **„Reshaping Unplugged Computer Science Workshops for Primary School Education"**, ISSEP 2023

S. Rain, Z. Avarikioti, L. Kovács, M. Maffei, **„Towards Game-Theoretical Security Analysis of Off-Chain Protocols"**, CSF 2023

L. Brugger, L. Kovács, A. Petković-Komel, S. Rain, M. Rawson, **„Automating Security Analysis of Off-Chain Protocols"**, FMBC 2022

N. Elad, S. Rain, L. Kovács, M. Sagiv, N. Immerman, **„Summing up Smart Transitions"**, CAV 2021

S. Rain, **„First-Order Reasoning with Aggregates"**, Master Thesis 2020

Community Service
- FMBC 2025 Programm Committee member
- FMCAD Student Forum 2024 PC member
- Member of the ATVA 2024 Artifact Evaluation Committtee
- Reviewer for the IEEE Transactions in Information Forensics and Security (T-IFS) journal 2024
- FMBC 2024 Programm Committee member
- Promoting careers in STEM at BG/BRG Hollabrunn (my former Highschool) November 2022
- Student Volunteer FloC 2022
- Abenteuer Informatik, TU Wien initiative to bring Computer Science to Volksschule (Austrian primary school)
- Student Volunteer CAV 2021
- Voluntary Fire Fighter (Freiwillige Feuerwehr Niederösterreich)

Invitations and Participation
Trail of Bits, presentation of my research, 2024

Selected as participant for the Heidelberg Laureate Forum, September 2023

Presented at Austrian Blockchain Community Seminar, July 2023

Presented at Days on Computational Game Theory Amsterdam, June 2023

WORLD.MINDS Annual Summit, December 2022

EUGAIN Summer School on Gender Balance in Informatics, Switzerland, June 2022

Winter School and Workshop on Proof Theory, Portugal, December 2021

Dagstuhl Seminar on Rigorous Methods for Smart Contracts, Germany, October 2021