

Sarah Hagen Adaime

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I. EDUCATION

- Aug. 2021 – Present **PhD in Physics** (in progress: Passed Preliminary Exam in October 2024, Passed Qualifying Exam in Aug. 2022)
Dept. of Physics, University of Illinois Urbana-Champaign (UIUC)
Urbana, IL
- Aug. 2021 – Dec. 2023 **M.S. in Physics** (non-thesis)
Dept. of Physics, University of Illinois Urbana-Champaign (UIUC)
Urbana, IL
- Sept. 2020 – June 2021 (No degree - Exchange)
Institut National de Sciences Appliquées Lyon
Villeurbanne, France
- Aug. 2017 – May 2021 **B.S. in Physics** (Minor in Mathematics)
Southern Illinois University Carbondale
Carbondale, IL
- Aug. 2017 – May 2021 **B.A. in Languages, Cultures, International Studies: French**
Southern Illinois University Carbondale
Carbondale, IL

II. RELEVANT EXPERIENCE

- Aug. 2021 – Present **Graduate Researcher/ Research Assistant 4 Semesters + Summers**
Department of Physics, UIUC, Urbana, IL
- Quantum Erasure Correction and Secret Sharing
And
 - Secret Sharing with a Helper/Programmable Access Structures
(with Eric Chitambar, David Kribs, Mike Nelson, Andrew Nemec)
We derive equivalent conditions for erasure correction, which form a new method for analyzing the feasibility of certain secret sharing schemes; additionally relax security conditions for secret sharing to explore so-called “helper” codes
 - Cryptographic reductions in the quantum setting
(funded by NSF-grant shared between Eric Chitambar, Dakshita Khurana, Lav Varshney)
(with Eric Chitambar, Daniel Alabi, Maxwell Gold)
Work includes an exploration of zero-communication reductions of PR boxes and similar correlations with non-signaling resources; we aimed to achieve larger goal of better understanding the relationships between classical and quantum cryptography

	- <u>Relativistic Quantum Bit Commitment</u> (with Shouvik Ghorai) We derive tighter bounds on the best quantum strategy for winning special nonlocal/CHSH games, which are equivalent to the cheating probability in relativistic protocols for building quantum bit commitment; we use semi-definite programming and NPA hierarchy coding in Python and MATLAB
May 2026 – July 2026	Visiting Graduate Researcher – Jamie Sikora Research Group <i>Department of Computer Science, Virginia Tech, Blacksburg, VA</i> - <u>Random Random Access Codes</u> (with Jamie Sikora) We introduce a new type of random access code in which the decoding accesses a random piece of information; the decoding of these codes is related to state learning; we motivate a notion of perfect codes, showing that there are only a few such examples and also look at these codes cryptographically
Aug. 2026 – Present	Course Instructor
Aug. 2025 – Dec. 2025	<i>Department of Physics, UIUC, Urbana, IL</i> - Two-time Instructor for PHYS222 (Accompanying course to calculus-based Electricity & Magnetism) - Instruct and grade in-class assignments and homework - Manage course website and grading - Host two weekly office hours to support students
Aug. 2025 – May 2026	High School Physics Instructor
Aug. 2022 – May 2023	<i>Faith & Reason Learning Community, Urbana, IL</i> - Designed, developed and implemented weekly lessons for introductory high school physics in home-school cooperative setting based on Novare curriculum - Instructed and graded six additional laboratory experiences a year with incremental expectations for lab reports - Provided 1-on-1 help for students upon request
Jan. 2025 – May 2025	Teaching Assistant/Mentor TA <i>Department of Physics, UIUC, Urbana, IL</i> - Taught PHYS102 (Algebra-based Electricity & Magnetism) - Instructed and graded discussion work - Office hour and outside-of-class discussions to support students
Aug. 2023 – Dec. 2024	Science Writer <i>Illinois Quantum Information Science and Technology Center (IQIIST), UIUC, Urbana, IL</i> <i>NSF-QLC Hybrid Quantum Architectures and Networks (HQAN) at UIUC, Urbana, IL</i> - Composed articles covering recent quantum research and publications, new course offerings, conference presentations, and special events - Traveled to special events and conferences as member of press - Interviewed faculty members and campus affiliates - Created new website series featuring HQAN alumni - Adapted coded website scraper to better amass recent publications

- Jan. 2023 – May 2023 **Teaching Assistant (Advanced Physics)**
Department of Physics, UIUC, Urbana, IL
- Instructor for discussion section of PHYS435 (Electromagnetic Fields)
 - Graded discussion work
 - Conducted weekly office hour and provided help otherwise needed
- Aug. 2021 – May 2022 **Teaching Assistant (Introductory Physics)**
Department of Physics, UIUC, Urbana, IL
- Discussion TA for PHYS 101 (introductory algebra-based mechanics and thermodynamics)
 - Discussion TA for PHYS 212 (introductory calculus-based electricity & magnetism)
 - Graded student problem sets and quizzes
 - Created additional instructional content including compiled practice problems, explanations, and student resources
 - Ranked 9.5/10 by anonymous student survey
 - Ranked as “Excellent” (4.3+/5 rating) and “Outstanding” (> Excellent)

III. SERVICE & LEADERSHIP

- Sept. 2026 – Present *Graduate Student Mentor* – **Guidance for Physics Students, UIUC**
- Mentor to two undergraduate students in 2026 cycle; general career advancement, coursework, or research advice
- Jan. 2025 – Present *Graduate Student Committee Member* – **Open Quantum Initiative**
- Reviewed over 400 applications to OQI summer fellowship program
 - Self-designed an improved program application evaluation system
 - Headed the implementation and assessment of efficacy of the new evaluation system in the second year on the committee
- Jan. 2022 – Present *Founder and Lead Organizer* – **Illinois Physics French Club**
- Founded organization within the UIUC Physics Department
 - Currently around 30 members, with about 15 regular attendees
 - In charge of programming for weekly meetings and special events
- Summer 2020 – Present *Writer* – **Personal Blog providing Academic Advice**
- Write posts about undergraduate and graduate school, and related topics (Website found at: <https://hageninter.net>)
- Feb. 2024 – May 2024 *Co-lead, “Physical Revue” Decorations* – **PGSA Gala Organizing**
- Headed design, purchase, set-up and tear down of annual Physics Dept. gala and charity fundraiser
- October 2023 *American Student Representative* – **French-American Doctoral Exchange (FADEx) “Cyber”**
- Selected as one of 10 students to represent U.S. graduate students working on different topics in cybersecurity
 - Traveled to Paris, Nancy, Rennes in France to meet with French public and private sector researchers, graduate students
 - Engaged in discussions about hot topics in both classical and quantum cybersecurity

July 2022 – Jan. 2023	Member – Local Organizing Committee CUWiP 2023 at UIUC - Organized the 2023 Conference for Undergraduate Women in Physics at the UIUC campus location - Speaker on several panels on applying to graduate school and life of a graduate student - Created parallel session “International Relations in Physics” - Check-in and speaker introduction among my roles at conference
July 2022	Conference Volunteer - TQC at UIUC - Assisted session chairs with Q&A portion
April 2022	Mentor – Physics REBoot Venezuela ICTP Physics without Frontiers - Co-mentored a group of 6 primarily undergraduate students on quantum algorithms project during one-week period - Evaluated student project presentations
Sept. 2021 – Jan. 2022	Member – Local Organizing Committee CUWiP 2022 at UIUC¹ - Organized the 2022 Conference for Undergraduate Women in Physics at the UIUC campus location - Speaker on several panels on applying to graduate school and beyond class activities - Headed a subcommittee responsible for check-in and other organizational tasks

IV. AWARDS & HONORS

2025-26 Acad. Year	Mavis Future Faculty Fellow <i>Grainger College of Engineering, UIUC, Urbana, IL</i> - Financial award to graduate students interested in careers in academia requiring career preparation classes and extra-curricular work
May 2026	Teacher Scholar Certificate <i>UIUC Center for Innovation in Teaching & Learning (CITL)</i> - Requirements include teaching philosophy statement, development of lesson, exploration of pedagogy in scientific literature, and service
Sept. 2022/'23/'24/'25	Physics Department French Club Funding Award <i>Department of Physics, UIUC, Urbana, IL</i>
Feb. 2024 for 2024-25	Fulbright U.S. Student Research Award (declined) <i>Fulbright U.S. Student Exchange Program</i> - Declined award to study device-independent quantum key distribution in the group of Jean-Daniel Bancal and Nicolas Sangouard at Paris-Saclay Institute of Theoretical Physics
October 2023	Franco-American Doctoral Exchange Program (FADEx) <i>Office of Science and Technology (SST), Embassy of France in U.S.</i> - Cybersecurity weeklong exchange in Paris/Rennes/Nancy, France
Feb. 2023	Best Talk (Networks and Security) <i>CSL Student Conference (see "Talks")</i>
Jan. 2023	Graduate Travel Award <i>Department of Physics, UIUC, Urbana, IL</i> - Award presented for registration for and travel to APS March Meeting

¹conference was canceled due to coronavirus concerns

May 2023 (Awarded)	Graduate Teacher Certificate
May 2022 (Completed)	UIUC Center for Innovation in Teaching & Learning (CITL) - Requirements include attending various formation events, teaching observed and critiqued by coordinator, and several written reflections on observation and student feedback collected at various instances

V. CONFERENCES AND FORMATION

Oct. 9 th -11 th , 2025	Southwest Quantum Information and Technology (SQuInT) University of New Mexico, Albuquerque, NM
July 29 th -Aug. 2 nd , 2024	Beyond IID in Information Theory Champaign-Urbana, IL
March 4 th -8 th , 2024	APS March Meeting (attended also as member of the press) Minneapolis, MN
July 24 th -29 th , 2023	Theory of quantum Computation, Communication, and Cryptography University of Aveiro, Aveiro, Portugal
March 5 th -10 th , 2023	APS March Meeting Las Vegas, NV
Feb. 22 nd -24 th , 2023	CSL Student Conference Coordinated Science Laboratory, UIUC, Urbana, IL
July 25 th -29 th , 2022	Graduate School on Post-Quantum and Quantum Cryptography University of California Los Angeles, Westwood, CA
July 11 th -15 th , 2022	Theory of Quantum Computation, Communication, and Cryptography (TQC) UIUC, Champaign, IL
July 12 th -23 rd , 2021	LPS Summer of Quantum Workshop Online hosted by Laboratory for Physical Sciences, College Park, MD

VI. TALKS

May 15 th , 2026	UT Dallas QIS Seminar University of Texas at Dallas, Richardson, TX <i>"Implementing Quantum Cryptographic Primitives: How do we Determine our Limits?"</i>
Oct. 10 th , 2025	SQuInT 2025 Conference University of New Mexico, Albuquerque, NM <i>"Structure Theorem for Quantum Replacer Codes"</i> ; co-authors: Eric Chitambar, David Kribs, Mike Nelson, Andrew Nemec
Nov. 15 th , 2024	Southern Illinois University Physics Seminar SIUC, Carbondale, IL <i>"Close to Home: How studying quantum cryptography brought me around the world and back"</i>
Oct. 2 nd , 2024	IQUIST Young Researchers Seminar UIUC, Urbana, IL <i>"Secret sharing: What is it and why should you care?"</i>

March 8 th , 2023	APS March Meeting Las Vegas, NV <i>"Using Non-Classical Resources to Strengthen Two-Party Zero-Communication Reductions"</i> ; co-author: Eric Chitambar
Feb. 24 th , 2023	CSL Student Conference Coordinated Science Laboratory, UIUC, Urbana, IL <i>"Non-Classical Zero Communication Reductions"</i> ; co-author: Eric Chitambar ❖ Awarded "Best Talk" in <i>Networks & Security</i> session
Feb. 22 nd , 2023	IQUIST Young Researchers Seminar UIUC, Urbana, IL <i>"Non-Classical Zero Communication Reductions"</i>

VII. POSTERS

July 26 th , 2023	Theory of Quantum Computation, Communication and Cryptography (TQC) Conference Aveiro, Portugal <i>"Non-classical Zero-Communication Reductions"</i> ; co-author: Eric Chitambar; poster
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VIII. PUBLICATIONS/PREPRINTS

2026 (preprint)	Gold, M., Hagen, S. , Alabi, D. and Chitambar, E. Quantum Secure Non-Interactive Reductions. <i>arXiv:2609.38452</i>
2026 (preprint)	Chitambar, E., Hagen, S. , Kribs, D.W., Nelson, M.I. and Nemec, A. Codes for Quantum Secret Sharing with a Helper. <i>arXiv:2609.00234</i>
2026 (preprint)	Chitambar, E., Hagen, S. , Kribs, D.W., Ma, Z., Nelson, M.I. and Nemec, A. Quantum Secret Sharing with a Helper and Programmable Access Structures. <i>arXiv:2609.00220</i>
2025	Chitambar, E., Hagen, S. , Kribs, D.W., Nelson, M.I. and Nemec, A. (2025) Structure Theorem for Quantum Replacer Codes. <i>Journal of Mathematical Physics</i> 66 , 122206, https://doi.org/10.1063/5.0280149
2021	Hagen, S. and Byrd, M. (2021) Detecting initial system-environment correlations in open systems. <i>Phys. Rev. A</i> 104 , 042406, https://doi.org/10.1103/PhysRevA.104.042406

IX. ORGANIZATIONS

Aug. 2023 – Present	UIUC Physics Dept. Spanish Club
Jan. 2022 – Present	UIUC Physics Dept. French Club (Founder and Lead Organizer)
Dec. 2021 – Present	Champaign-Urbana Catholic Young Professionals
Aug. 2021 – Present	American Physical Society (graduate student)
Feb. 2022 – May 2022	UIUC German Club

X. TECHNICAL SKILLS

- **LaTeX** (Advanced)

- **Mathematica** (Proficient)
- **Python** (Proficient)
- **MatLab** (Proficient)
- **GitHub** (Beginner)

XI. LANGUAGES

- **English** (Native)
- **German** (Native)
- **French** (Fluent)
- **Lebanese Arabic** (Beginner)
- **Spanish** (Beginner)

XII. REFERENCES

Dr. Eric Chitambar (Advisor)

Position: Professor of Electrical and Computer Engineering
 Department of Electrical and Computer Engineering
 University of Illinois Urbana-Champaign
 1308 W. Main St., Urbana, IL 61801
 Phone: (763) 242-3381
 E-Mail: echitamb@illinois.edu

Dr. Jamie Sikora (Internship Advisor, Collaborator)

Position: Assistant Professor of Computer Science
 Department of Computer Science
 Virginia Polytechnic Institute and State University
 Torgersen Hall, RM 2160E, 620 Drillfield Dr., Blacksburg, VA 24061
 Phone: (540) 231-5964
 E-Mail: sikora@vt.edu

Dr. Andrew Nemec (Collaborator)

Position: Assistant Professor Computer Science
 Department of Computer Science
 University of Texas at Dallas
 ECS 4.212
 Phone: (972) 883-3996
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Dr. Elizabeth Goldschmidt (Committee Chair, OQI Advisory Committee Colleague)

Position: Associate Professor of Atomic, Molecular, and Optical Physics
 Department of Physics
 University of Illinois Urbana-Champaign
 1110 W. Green St., Urbana, IL 61801
 Phone: (217) 333-0071
 E-Mail: goldschm@illinois.edu

Dr. Mark Byrd (Co-Author, Undergraduate Advisor, now: Oak Ridge National Laboratory)

Position: Lead Quantum HPC Scientist
 Phone: (865) 341-1785
 E-Mail: byrdms@ornl.gov