Sam Rager

EDUCATION

Columbia University, Columbia College – New York, NY   **Expected Graduation: 05/2025**
Bachelor of Science in Theoretical Physics and Applied Mathematics
University of New South Wales – Sydney, NSW   **Semester Abroad: 01/2024-05/2024**
Honors/Awards: University of New South Wales Honors in Humanities and Languages (2024), Ohio State University Howard Honors Book Award (2021), 4.0 Unweighted Ohio Honors Diploma (2021)
Relevant Coursework: Graduate Quantum Field Theory II, Behavioral Economics, Financial Management

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TECHNICAL SKILLS & INTERESTS

- **Full Stack Development:** SQL, PostgreSQL, HTML, CSS, JavaScript, Flutter, Swift, Firebase, Docker, Google Cloud, Flask
- **Engineering Software:** SolidWorks, AutoCAD, LTSpice, Verilog, VHDL, LightBurn, Mathematica, Zemax
- **Multimedia Design Software:** Figma, Spline, Canva, CapCut
- **Computer:** MS Office, Google Workspace
- **Data Analysis and Visualization:** Python, Dash, Plotly, Pandas, Tableau
- **Languages:** German (conversational)
- **Interests:** Stories, Mathematical Modeling, Entrepreneurship, Functional Lifting, Photonics, Electric Propulsion, Guitar, Brazilian Jui Jitzu, Rock Climbing

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RELEVANT PROJECTS

- **QFT Asset Pricing Model** https://github.com/56sarager/Colabs/blob/main/QFT_Asset_Pricing.ipynb Derived a correlation function from basic assumptions about the law of supply and demand and used perturbation theory to fit it to market data
- **Implied Volatility Visualizations** https://github.com/56sarager/Colabs/blob/main/Implied_Volatility.ipynb Generated interactive implied volatility surface plots and compared the results obtained by either using the Brent or Newton method
- **KPI Dashboard** https://github.com/56sarager/Colabs/blob/main/Yahoo_Finance_Dashboard.ipynb Compiled data from to create a customizable dashboard with relevant key performance indicators and metrics for publicly traded companies
- **Computer Vision** https://github.com/56sarager/Graphene-Classification Wrote a program to detect the presence of graphene flakes in image stills from a microscope to decrease the eye strain researchers experience searching for them manualy
- **Ariadne** https://github.com/56sarager/Ariadne Webscraped job postings and used RAKE to identify key words in the descriptions and qualifications to efficiently identify opportunities because 70% of online job postings are fake
- **StorySphere** https://github.com/56sarager/StorySphere Designed the frontend for a website similar to Letterbox but for avid readers, using Spline to create an animated landing page, and the Open Library api to retrieve book cover images and data
- **B1** https://github.com/56sarager/B1 Designed an "augmented" social media app for iOS using Swift and the Spotify API to show what a user is listening to to any other active users within a given radius and let them comment with an emoji
- **Optical Trapping** https://github.com/56sarager/Colabs/blob/main/Laser_Tweezer_Analysis.ipynb Constructed a 18mW helium-neon laser and coupled it into a microscope to trap particles in a potential well then wrote the program to analyze this data
- **Data Transmission** https://rager-s.com/academics Directed a He-Ne laser through an piezo-electric acousto-optic modulation system and onto a photodiode to transmit audio signals to a speaker by modulating the carrier wave
- **Interferometry** https://rager-s.com/academics Built a Mach-Zehnder interferometer and rebuilt a mechanical Fabry Perot
- **Firmware** Programmed field programmable gate arrays (FPGAs) with logic to emulate classic games such as pong

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PROFESSIONAL DEVELOPMENT

Apple Developer Program – *Member*   **01/2025 – Present**
- Gained hands-on experience with iOS/macOS app development, testing, and distribution.

Google Advanced Data Analytics Professional Certificate – *Participant*   **06/2023 – 08/2023**
- Learned industry best practices for data analytics and the methodical structure Google professionals use for their projects
- Produced data visualizations using Matplotlib, Seaborn, and Tableau for toy datasets

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WORK EXPERIENCE

Columbia Climate School Center for Climate Systems Research – *Research Assistant* | New York, NY   **02/2025 – Present**
- Implement quantum extensions to the TWIST model, which currently simulates global commodity flows and national storage decisions, price formation and market responses, production shocks and their propagation through trade networks, and national-level policy responses with respect to export restrictions and reserve management
- Develop test scenarios and created synthetic datasets to validate policy decision dynamics and explore interactions between storage decisions and trade restrictions
- Document mathematical framework and implementation and present progress at weekly group meetings

Village of Mount Gilead – *Park Coordinator* | Mount Gilead, OH   **Summers 2023 – 2024**
- Led a team of 40 lifeguards, food vendors, village sanitation workers, and general laborers to maintain a 46-acre complex
- Liaised with administration, contractors, and suppliers to ensure facility's efficiency and safety
- Recognized community needs, such as lack of air conditioned homes, to offer free entry if the heat index exceeded 100
- Complied with state and federal guidelines by maintaining detailed records of water tests and incidents