Anuraj Laha

Graduate Student
Department of Physics and Astronomy
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Research Interests

Experimental atomic, molecular, and optical (AMO) physics; quantum information processing with neutral atoms trapped in optical tweezer arrays; coherent control of atomic qubits.

Education

University of Oklahoma, Norman, OK, USA 2021–Present
Ph.D. in Physics
Advisor: Dr. Grant W. Biedermann
Research Area: Experimental AMO Physics
Dissertation Research: Design and control of trapped-atom qubits for quantum information science
GPA: 4.00/4.00

Indian Institute of Science Education and Research Kolkata, India 2016–2021
B.S.–M.S. Dual Degree in Physics
MS Project Advisor: Dr. Nirmalya Ghosh
MS Thesis: Spin-Orbit Interaction of Light in Inhomogeneous Anisotropic Media
GPA: 9.11/10.00

Research Experience

Graduate Researcher | University of Oklahoma 2021–Present
Design and control of trapped-atom qubits for quantum information science

- Designed, constructed, and commissioned an upgraded cesium optical tweezer apparatus, improving vacuum quality, extending trapped-atom lifetime, and increasing experimental data acquisition rates.
- Optimized the single-atom imaging system, achieving a detection fidelity of **99.95%**.
- Demonstrated single-photon Rydberg excitation of cesium atoms using ultraviolet (UV) laser light for probing entanglement between neutral-atom qubits.
- Mentored two undergraduate researchers in optical alignment techniques and experimental data processing.

Publications

[1] A. B. S., S. Mukherjee, **A. Laha**, K. Bar, D. Nandy, and N. Ghosh,
"Experimental Observation of the Orbital Hall Effect of Light Through Pure Orbit–Orbit Interaction for Randomly and Radially Polarized Vortex Beams."
Journal of the Optical Society of America B **38**, 2180–2186 (2021).

Conference Presentations

APS DAMOP Meeting, Providence, RI June 2026
Poster Title: Microfabricated Collimators for a Cesium Atom Interferometer Gyroscope.
Authors: **Anuraj Laha** (presenter), Luke Kraft, Alec Gaddie, Grant Biedermann, Ryan Cardman, Conrad Smart, Dung Quach, Tanner Pearson, Nicholas Bender, Peter Stark, Joel Hensley.

Teaching Experience

Graduate Teaching Assistant | University of Oklahoma 2021–2026

- **Quantum Coherent Metrology (PHYS 5970)** — Fall 2026. Grader.

- **Electronics (PHYS 2303)** — Fall 2022. Conducted laboratory sessions and evaluated laboratory reports.
- **Introductory Physics II for Majors (PHYS 1215)** — Spring 2022. Led laboratory sessions.
- **General Physics for Life Sciences (PHYS 2414)** — Fall 2021. Conducted recitation sessions.

Teaching Assistant | IISER Kolkata 2020–2021

- **Atomic and Optical Physics** — Spring 2021. Grader.
- **Mechanics II** — Autumn 2020. Grader.

Awards and Honors

2026	**Avenir Fellowship**, Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma (Spring–Summer).
2016	**INSPIRE Scholarship**, Department of Science and Technology, Government of India.
2016	**JBNSTS Senior Scholarship**, Jagadis Bose National Science Talent Search, Kolkata, India.

Technical Skills

Experimental	Optical alignment, ultra-high-vacuum systems, RF electronics, Rydberg spectroscopy.
Programming & Control	Python (NumPy, ARC, ARTIQ), MATLAB, LabVIEW.
Data Analysis	MATLAB, Mathematica, Origin, custom Python analysis and automation scripts.
CAD & Design	SolidWorks.