


# SHARJEEL AHMAD

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## Education

University of Illinois Urbana-Champaign (UIUC)

Master of Science in *Physics*

cGPA: **3.89**/4.00

Aug 2024 – Present

Urbana-Champaign, Illinois

Lahore University of Management Sciences (LUMS)

Bachelor of Science *Physics Major, Mathematics Minor*

Sep 2020 – Jun 2024

Lahore, Pakistan

## Research Experience

Graduate Research Assistant

Fall 2024 – Present

Supervisor: Dr Paul Kwiat

UIUC

- Successfully developed computer-generated **Multi-depth Holograms** using **iterative backpropagation** on MATLAB
- **Optimized** the system to yield **high-resolution outputs** for triple-depth holograms on a photographic film platform
- Analyzed experimental data to **accurately predict** variations in hologram focal length based on project parameters

Graduate Research Assistant

Fall 2024 – Present

Supervisor: Dr Kejie Fang

UIUC

- Conducting experiments for telecom photon **wavelength conversions** under low power conditions using **Indium gallium phosphide** (InGaP) micro-waveguides
- Did a literature review and fidelity derivations on **Heralded Entanglement Photon Generation** on SPDC systems and Non-linear Sum-Frequency Generation systems
- Explored various photonic systems to derive equations for experimentally calculating **Non-Gaussian Correlations** in entangled photons

Senior Year Project

Spring 2024

Supervisor: Dr Adam Zaman

LUMS

- Currently doing literature review on the **Lindblad Master Equations** and **Liouville's Theorem**
- Applying a variation of Kubo Formulation to study the **Time Evolution** of particular **Open Quantum Systems** such as driven **Spin-Boson** systems
- Studying various **Perturbation Theories** which are commonly applied in Open Systems as well as **Heat Transport** equations

Directed Research Project

Spring 2023

Supervisor: Dr Adam Zaman

LUMS

- Carried out **literature review** to compile a **report** on the fundamental principles of **Quantum Linear Response Theory**, and its potential uses in solving out of equilibrium Quantum Systems

Approximate Quantum Fourier Transforms (AQFT)

Spring 2023

Supervisor: Dr Sabieh Anwar

LUMS

- Investigated the use of AQFTs in various **Quantum Algorithms** including Periodicity Estimation, Shor's Factoring and Quantum Addition
- Presented a **report** showcasing the advantages of AQFTs in reducing **Decoherence** by reducing the number of gates required to carry out the algorithm
- Utilized **Qiskit** (python) to verify theoretical findings under various initial conditions

Plastic Detection using Liquid Crystals

Summer 2023 – Present

Research Assistant under Dr Ammar Ahmed

LUMS

- Collaborated with the life sciences department to utilize the **Nematic Liquid Crystal '5CB'** to differentiate various plastics found in the local environment through **Optical Birefringence**
- Submitted a **presentation** which analyzed the collected data through **Rotational Analysis** in a **Polarized Microscope** on the plastic samples coated with 5CB

- Currently working on creating a roughness profile of the various plastic samples by taking **2D Fast Fourier Transforms** of the captured images in **MATLAB**

## Topological Defects and Photo-lithography in Liquid Crystals

Spring 2021 – Spring 2023

Research Assistant under Dr Ammar Ahmed

LUMS

- Conducted experimental research on **Lyotropic** and **Non-Lyotropic Liquid Crystals** and their applications in bacterial transport
- Employed **Auto-CAD** to generate micropatterns on a photo-lithography mask for the **Functional Materials and Optoelectronic Devices** group which is still used today

## Professional & Volunteer Work

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### Pakistan National Debate Team

Jan 2023 - Jul 2024

Coach Lahore, Pakistan

- Selected to to train and **manage** the National Team to **Serbia WSDC 2024** held in July
- Streamlined the team selection process by creating a Python code to collect and analyze **36 unique data points** across **40 shortlisted applicants** to sort them by their weighted Z-scores
- Held regular training camps to improve the team's persuasive speaking skills by focusing on strategic thinking, enabling them to reach the Octafinals of WSDC 2024

### Lahore Grammar School Defence Campus

Oct 2021 – May 2024

Parliamentary Debates Coach

Lahore, Pakistan

- Hired as a **full-time debates coach** to teach over a **100 high-school students** logical analysis, critical thinking and persuasive speaking
- Assisted the LGS Defence Debates Team in reaching the **Final** of All Pakistan Senior Debating Championship 2022 for the first time in **seven years**

### Community Service Society - Bloodlink

Fall 2021 – Fall 2022

Volunteer

Lahore, Pakistan

- Introduced a **Digitization Framework** to reduce response time and alleviate the need for manual oversight
- Maintained a **24-hour helpline** on designated days, connecting hundreds of patients with blood donors

## Honors & Awards

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### Dean's Honor List

Fall 2020 – Fall 2024

- Awarded for maintaining a **cGPA greater than 3.6** in each semester

LUMS

### Chandrasekhar Honorific Fellowship

Fall 2022 – Fall 2024

- Awarded twice for **academic excellence in basic science** from a cohort of 60 candidates

LUMS

### 50% Merit Scholarship

Fall 2020 – Fall 2022

- Awarded for being in the **Top 10 freshman and sophomore undergraduate students** in the LUMS School of Science and Engineering

### World Schools Debating Championship

Jul 2019, 2020

Two time Member of national team

Thailand, Online

- Selected to serve in the **National Team** out of a pool of **300 candidates** from all across Pakistan
- Ranked as the **8th Best Speaker in the world** in the English as Second Language Category

### 120% Merit Scholarship

Sep 2018 – 2020

- Awarded for the entirety of high school A Levels program based on **outstanding academics** and extracurriculars

## Skills & Interests

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**Skills:** Data Analytics (Python & MATLAB), LaTeX, Microsoft Office

**Interests:** Public Speaking, Tennis, Mixed Martial Arts, Fantasy Novels