

Meesum Qazalbash

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EXPERIENCE

LIGO Scientific Collaboration

Rates & Population Group Member

USA

May 2026 – Present

Habib University

Research Assistant

Karachi, Pakistan

Aug. 2024 – Aug. 2026

Undergraduate Researcher, Summer Tehqiq Research Program II

June 2023 – Aug. 2023

Undergraduate Researcher, Summer Tehqiq Research Program I

June 2022 – Aug. 2022

RESEARCH INTERESTS

Gravitational-Wave Astronomy, Bayesian Inference, Scientific Computing, Diffusion Based Models

EDUCATION

Rochester Institute of Technology

PhD in Astrophysical Sciences & Technology

Rochester, NY, USA

Aug. 2026 – Present

Habib University

B.Sc. in Computer Science; CGPA: 3.7/4.0

Karachi, Pakistan

Minor in Mathematics

Aug. 2020 – June 2024

OPEN SOURCE SOFTWARES

GWKokab | [GitHub](#), [Docs](#)

Co-developed a JAX-based, open-source framework for GPU-accelerated population inference of compact binary coalescences.

NumPyro | [GitHub](#), [Contributions](#)

One of the core contributors and collaborators.

PAPERS

As a member of the LIGO Scientific Collaboration since May 2026, I am a co-author of several full-collaboration papers. Listed below are those to which I contributed directly.

4. R. O'Shaughnessy, M. Zeeshan, **M. Qazalbash**. *Physics-based phenomenological modeling of binary black hole hierarchical formation 2: Autodifferentiable functional inference of hierarchical compact-binary populations*. arXiv. Sep. 6, 2026. doi:[10.48550/arXiv.2609.06728](#)
3. R. O'Shaughnessy, R. Mechum, **M. Qazalbash**, Z. Rosenberg, M. Zeeshan. *Physics-based phenomenological modeling of binary black hole hierarchical formation 1: Synthetic universes from globular cluster simulations for GWTC*. arXiv. Sep. 5, 2026. doi:[10.48550/arXiv.2609.05996](#)
2. **Meesum Qazalbash**, Sophiya Mehra, Muhammad Zeeshan, Vera Delfavero, Richard O'Shaughnessy. *Narrow Population Inference Enhanced by Analytical Likelihood Models*. arXiv. July 29, 2026. doi:[10.48550/arXiv.2608.24475](#)
1. **Qazalbash, M.**, Zeeshan, M., & O'Shaughnessy, R. *Implementation to identify the properties of multiple populations of gravitational wave sources*. Phys. Rev. D, 113(10), 103003. May 4, 2026. doi:[10.1103/krnm-3vrf](#)

HONOURS

Talent Outreach, Promotion and Support Program Scholar (full merit)

Aug. 2020 – May 2024

Dean's List, Dhanani School of Science and Engineering at Habib University

May 2022

Adamjee Excellence Award, ranked 7th among 20,000+ candidates in HSC II examination

Sep. 2020

ACHIEVEMENTS

International Collegiate Programming Contest, Asia Regional qualifier (did not attend)

Nov. 2023

Games of Code 5.0, 1st place (PKR 50,000)

July 2023

Invent for the Planet, 2nd runner-up in Pakistan (PKR 10,000)

Feb. 2023

Games of Code 4.0, 1st runner-up	Sep. 2022
International Collegiate Programming Contest, 18th runner-up in the Regional Contest	March 2022
Games of Code 3.0, 1st runner-up	Sep. 2021

TEACHING AND MENTORING

Rochester Institute of Technology	<i>Rochester, NY, USA</i>
<i>Graduate Teaching Assistant, University Physics I</i>	Aug. 2026 – Dec. 2026
Habib University	<i>Karachi, Pakistan</i>
<i>Teaching Assistant, Operating Systems</i>	Aug. 2023 – Dec. 2023
<i>Teaching Assistant, Data Structures & Algorithms</i>	Jan. 2023 – April 2023
<i>Teaching Assistant, Programming Fundamentals</i>	Aug. 2022 – Dec. 2022
<i>Teaching Assistant, Engineering Mathematics</i>	Aug. 2022 – Dec. 2022
<i>Teaching Assistant, OOP & Design Methodologies</i>	Aug. 2021 – Dec. 2021
<i>Teaching Assistant, Calculus I</i>	Jan. 2021 – April 2021

SKILLS

Programming Languages: C, C++, Julia, Python, Rust
Technologies/Frameworks: CUDA-C, JAX, NumPy, NumPyro, Pandas, Polars, PyTorch
Tools: Bash, Emacs, Git, LaTeX, Linux, Typst, Vim
Languages: Urdu (Native), English (IELTS 7.0)

EXTRACURRICULAR ACTIVITIES

Madarsa-e-Riyaziyat, mathematics summer camp for high-school students	July 2024
Habib Maths Club School Outreach, mathematics workshops across Karachi	Jan. 2024
Mathema, organizing team for the inter-school mathematics competition	Dec. 2022
Habib Maths Club, founding member and student lead	June 2021 – April 2022