(Brief CV; November 2025)

Rashid Mubashir Talha

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Primary Focus: Differential geometry, Lie algebras, algebraic geometry, mathematical physics, gravity and cosmology.

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§ EDUCATION.

Postgraduate Diploma Programme in Mathematics (ICTP, Italy, 2025–).

- Fully funded programme. Expected graduation: August 2026.

Bachelor of Science in Mathematics (NUST, Pakistan, 2021–2025).

- CGPA: 3.99/4.0. Ranked 1st in the cohort.
- Thesis: Ehresmann Connections on Fiber Bundles (supervised by Prof. Tooba Siddiqui)
- Additional coursework: Quantum Field Theory.

Diploma of Higher Education (University of Warwick, UK, 2017–2021).

- Integrated joint degree for mathematics and physics, leading to an award of DipHE before transferring.
- Ranked 3rd in the cohort in year 1 and 4th in year 2.

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§ ADDITIONAL QUALIFICATIONS & SKILLS.

- IELTS Academic: 8.5 Bands (August 2024).
- GRE Math Subject Test: 88^{th} percentile (November 2023).
- Programming & scientific computing: Python, C, Mathematica, MATLAB, LaTeX; Linux.
- Languages: Urdu (native), English (native).

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§ AWARDS & ACHIEVEMENTS.

- President's Gold Medal, NUST (2025). Highest-ranking graduate in the cohort.
- Rector's Gold Medal, NUST (2025). Best final-year project and thesis in BS Mathematics.
- High Achiever Award, NUST (2025). For excellent performance in extra-curricular academic initiatives.
- 1st Position, NUST Mathematics Olympiad (2024). Individual participation; cash prize of PKR 25,000.
- 1st Position, National Mathematics Quiz Competition, NUML. Consecutively in 2023 and 2024.
- Academic Excellence Scholarship, NUST (8-time recipient). Highest GPA in the cohort each semester.

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§ PUBLICATIONS.

- Development of oceanographic acoustic modelling tools for streamlined transmission loss analysis. International Bhurban Conference on Applied Sciences and Technology (IBCAST 2024), 694–700.
- Application of computational fluid dynamics and physics informed neural networks in predicting rupture risk of thoracoabdominal aneurysms with fluid-structure interaction analysis. Chin. J. Phys. (2025).

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§ PRESENTATIONS & ADDITIONAL ACTIVITIES.

- Conference talk at the 21st IBCAST in the Underwater Technologies track. Fully funded project (2024).
- Presentation at the weekly graduate mathematics seminar, during undergraduate studies (NUST, 2024).
- Student member of the organising committee for the conference on 'Recent Trends in Mathematics' (NUST, 2024).
- Introductory talk titled 'Introduction to Gravity and its Quantisation' to undergraduate students. Hosted by the NUST Physics and Astronomy Society (NUST, 2023).

§ ACADEMIC PROJECTS.

Ehresmann Connections on Fibre Bundles (Final Year Project, 2024–2025).

Conducted a review of the theory of connections and curvature on vector bundles. Generalised to Ehresmann connections on fibre bundles, and studied the Yang–Mills connections as an important special case. Discussed applications to mathematical physics, general relativity and machine learning. Supervised by Dr Tooba Feroze.

Physics Informed Neural Networks (PINNs) for Fluid Profile in Aneurysms (2024).

Constructed a physics informed neural network (PINN) for the simulation of Navier–Stokes PDEs to obtain the pressure distribution along the medial and transverse plans in thoracoabdominal aneurysms. The results agreed with the flow profiles numerically obtained through traditional CFD modelling.

Adaptive Mesh Refinement (AMR) for Tsunami Propagation with Coriolis Effects (2024).

Used implicit mesh refinement techniques to investigate the influence of Coriolis force on the accuracy of shallow water equations in the context of Tsunamis. This extends the work of Berger and LeVeque (2024). Joint work with Hina Irum and Dr M. Asif Farooq from SNS.

Acoustic Modelling Tools with Latest Oceanographic Data Retrieval (2023).

Developed a robust, modular, modern python CLI for data discovery, analysis and acoustic modelling. The software was integrated with `KRAKEN` and `BELLHOP`. Fully funded project supervised by Dr M. Asif Farooq, NUST, Pakistan. Findings were presented at the annual IBCAST conference (2024).

Behaviour of the Multipole Solutions of the 5th order mKdV equation (2022).

Studied the construction of multiple-pole solutions of the 5th order modified KdV PDE and reproduced the results from Zhao Zhang et al, 2021. Supervised by Dr Ahmad Javid, NUST.