

Syed Hussain Haider

📍 London, UK 📞 +44 7424801023 @ syedhussainhaider137@gmail.com
🌐 syedhussainhaider137 🌐 Personal Website

Personal Profile

I am a physics graduate holding a First Class BSc in Physics with Theoretical Physics from King's College London, now beginning the MSc in Quantum Fields and Fundamental Forces at Imperial College London. My main interest is in the mathematical structures behind quantum theory, field dynamics and gravitation. During my degree I worked with Prof. James Millen and Dr. Qiongyuan Wu on imaginary-time evolution, using Wick rotation to recast the Schrödinger equation as diffusion-type behaviour, and implemented numerical methods to study the decay of higher-energy states. I performed strongly across the theoretical modules, including 94% in Electromagnetism, and held a First-Class average throughout. Through the MSc I aim to move toward research in quantum field theory, gravity, and the foundations of modern theoretical physics.

Education

Imperial College London: MSc Quantum Fields and Fundamental Forces Sep 2026 – Present

King's College London: BSc Physics with Theoretical Physics Sep 2023 – Aug 2026

- Achieved: 79.2% overall (First Class Honours)

Relevant Modules: *Quantum Mechanics I & II, Electromagnetism, Mathematical Methods for Theoretical Physics, Advanced Mathematical Methods, Symmetry in Physics, Statistical Mechanics, Thermal Physics and Properties of Matter, Relativity and Sub-Atomic Physics, Particle Physics, General Relativity & Cosmology, Condensed Matter Physics, Third-Year Project in Physics*

Research Experience

Undergraduate Researcher, King's College London Aug 2025 – Oct 2025

- Conducted research under supervision of Prof. James Millen and Dr. Qiongyuan Wu as part of the **King's Experience Research Award**.
- Applied Wick rotation to reformulate the Schrödinger equation as a heat equation, enabling imaginary-time evolution of quantum states to project out the ground state and lower-lying eigenstates.
- Developed Python solvers implementing Crank–Nicolson scheme, tridiagonal solvers, and Gram–Schmidt orthogonalization to compute eigenstates of asymmetric double wells, quartic oscillators, position-dependent mass systems, and hydrogen-like potentials.
- Benchmarked numerical methods against published literature, achieving agreement to multiple significant figures, and investigated tunneling splittings and parameter dependencies.
- Produced computational results, academic poster, and reflective essay for formal recognition through the award.

Dark Matter Communication in the AI Era, King's College London Jan 2026 – May 2026

- Conducted a research-led project under the supervision of Dr. Christopher McCabe, examining how core concepts in **dark-matter theory and experiment** can be communicated effectively in the era of generative AI.
- Analysed weekly themes in early-universe physics and dark-matter detection while critically evaluating the behaviour, limitations, and biases of **AI-generated scientific content**.
- Produced structured $\LaTeX$ reports for each investigation and prepared an assessed **research poster** together with a corresponding **oral presentation**.
- Developed technically rigorous science-communication outputs across written, visual, and multimedia formats, with emphasis on clarity, precision, and audience adaptation.

Conference Presentations

Speaker, QUIRK+ 2026 Student Research Conference Jan 2026

- Delivered a research talk titled “*Why Imaginary Numbers Matter in Quantum Mechanics*”.
- Contributed to QUIRK+, a multi-university physics conference jointly organised by QMUL, UCL, Imperial, RHUL, KCL, Oxford, Cambridge, and others.

- Presented results from King's Experience Research Award research on Wick rotation and imaginary-time evolution in quantum mechanics.
- Demonstrated how diffusion-like evolution enables numerical extraction of ground and excited states in quantum systems.

Science Communication

Founder, Short Science (Instagram, TikTok, YouTube) **2022 – Present**

- Built an educational platform with **25,000+ followers on Instagram** and audiences across TikTok and YouTube, with videos reaching millions of views.
- Produced short-form educational content on physics, philosophy, and psychology, making complex ideas accessible through engaging visuals and narration.

Scientific Essay Project (Personal Website) **2024 – Present**

- Authored **30+ scientific essays** expanding on video topics, published on personal website.
- Essays provide rigorous, detailed, and accessible explanations for a wide audience in physics and related fields.

Additional Experience

Maths & Physics Tutor, Axis Tuition Centre (GCSE & A-Level) **Nov 2024 – Jan 2025**

- Delivered targeted instruction to GCSE and A-Level students in mathematics and physics.
- Designed and implemented structured lesson plans to improve understanding and exam performance.

Vice President, KCL Quantum Mechanics Society **May 2025 – May 2026**

- Led the society's academic initiatives, including organizing and delivering student lectures introducing foundational topics in quantum mechanics to audiences of 50+.
- Coordinated guest seminars featuring researchers such as Prof. James Millen, fostering discussions on cutting-edge developments in quantum physics.
- Established and hosted weekly problem-solving sessions, supporting students with coursework and deepening conceptual understanding in physics.

Relevant Research Skills

- Computational modelling in Python and advanced proficiency in $\text{\LaTeX}$
- Persistence and independence in tackling open-ended research problems
- Precision in mathematical reasoning and analytical derivations
- Strong ability to interpret and synthesise theoretical physics literature