Nishwal Gora

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EDUCATION

University of Edinburgh **Edinburgh, Scotland**

Physics (MPHYS) *Sep. 2021 – June 2026*

- *Achievements: 2022/2023,* 2021/22: Awarded the Certificate of Merit for MPhys Physics
- *Activities:* Edinburgh Scientific Researchers Association, Edinburgh University Science Media

Bishop Anstey and Trinity College East Sixth Form **Trinidad and Tobago**

Caribbean Advanced Proficiency Examination (CAPE) *July 2018 - July 2020*

- *Education:* Physics, Pure Mathematics, Chemistry, Caribbean Studies, Communication Studies. Achieved 1's in every subject.
- *Achievements:* On the Merit List (a ranking listing the highest marks achieved at the yearly diet), placed 6th (Unit 1, 2019) and 8th (Unit 2, 2020) for Pure Mathematics. Also ranked 4th (Unit 1, 2019) and 1st (Unit 2, 2020) in Physics.

RESEARCH PROJECTS

Career Development Summer Scholarship (2024) **Edinburgh, Scotland**

July 2024 – August 2024

-We investigated the quantum critical properties of $Na_2BaCo(PO_4)_2$, a triangular antiferromagnet with efficient adiabatic demagnetization cooling near 1.6 T. Using high-resolution neutron spectroscopy, we analysed the evolution of magnetic excitations, showing that well-defined ferromagnetic fluctuations become overdamped near the critical point, leading to spatial magnetic disorder. By modelling these excitations as coupled Zeeman-split Kramer's doublets, we identified their role in the system's magnetocaloric efficiency, highlighting frustrated magnets near quantum criticality as promising candidates for cooling applications.
(https://arxiv.org/abs/2503.00462)

Senior Honours Project (PHYS10087) (2025) **Edinburgh, Scotland**

Jan. 2025 – March 2025

- I investigated spin excitations in $CoTiO_3$ using a Green's function approach, modelling its spin-wave dynamics with RPA and mean-field theory. To address non-collinear magnetic ordering, I applied a spin rotation technique, enabling direct comparison with neutron scattering data. My results highlight the role of bond-dependent interactions in enhancing out-of-plane magnetic coupling, which I postulate is the due to symmetry reduction that occurs in the crystal below 30K allowing for the formation of dimers along specific directions. This will be converted into a paper to be published soon.

Group Project (PHYS11011) (2024/2025) **Edinburgh, Scotland**

Oct. 2024 – Feb. 2025

- We explored the thermodynamic limits of timekeeping accuracy, analysing how entropy production and energy dissipation constrain clock precision using Thermodynamic Uncertainty Relations (TURs). By modelling clocks as dissipative systems governed by stochastic dynamics, we derived lower bounds on the entropy cost of accurate time measurement, showing that increased precision requires greater dissipation. Our findings highlight the deep

connection between entropy, irreversibility, and precision, with implications for quantum metrology, precision engineering, and ultra-stable timekeeping technologies.

EXTRA-CURRICULAR ACTIVITIES

Edinburgh Scientific Researchers Association (ESRA) - **Edinburgh, Scotland**

Sep 2021 – Present

- September 2021 – September 2022: *Member of Physics Department in ESRA.* pursued project to age a Galaxy Cluster using a telescope in the Royal Observatory, Edinburgh.
- September 2022 – April 2023: *Co-Head of Department of Physics*, guiding research projects on 1) computer simulation, 2) Finding the value of the cosmological constant 3) Building an efficient Solar Panel.
- April 2023 – Present: *Treasurer of ESRA*, providing and securing funding for projects in Biology, Social Sciences, Chemistry and Physics.

Edinburgh University Science Media (EUSci) - **Edinburgh, Scotland**

Feb 2024 – Present

- Contributing Editor –
    - Acted as editor for article "*Exploring the interdependence between politics and science*" in Issue 32 EUSci magazine.
- Contributing writer – Individually wrote articles for the eusci.org.uk website, making science accessible to the general reader:
    - *1) Crisis in Cosmology – The Laniakea supercluster and what it means for the universe,*
    - *2) Fusion Energy: A Viable alternative to fossil fuels*

Global Buddies - **Edinburgh, Scotland**

Sep 2022 – July 2023

- *Buddy Leader* – Assisted group of international students adjust to Edinburgh by organising meet ups, group activities, tours etc.

Prism Caribbean - **Trinidad and Tobago**

Founder/Contributor *Jan 2022 - Jan 2023*

- Developed learning material (specifically mathematics) for Caribbean students who are economically disadvantaged.

SKILLS AND INTERESTS

Skills:

Public Speaking | Writing and Pedagogical Communication | Proficient in Python, R, MatLab and LaTex| Computer Modelling, Linear Algebra, Calculus, Data Analysis | Qualified in AutoCAD (Specifically Engineering Drawing) |

Interests:

Sports - Former school cricket captain, chess player.

Mathematics – Certificate from Euclid Mathematics Contest (University of Waterloo).

History and Economics – Written newspaper articles on rural migration in Scotland, Indian Independence movements and the state of the Trinidadian economy post-COVID.