ENOCH KO

ST JOHN'S COLLEGE, CAMBRIDGE, CB2 1TP
HTTPS://ENOCH-KO.GITHUB.IO

EDUCATION

MASt Theoretical Physics (Part III Mathematics) July 2026
St John's College, University of Cambridge *(expected)*

BSc Mathematics and Physics July 2024
University of Warwick – First Class Honours

PUBLICATION

[1] "Renzo's rule revisited: a statistical study of galaxies' baryon–dark matter coupling"; **E. Ko**, T. Yasin, H. Desmond, R. Stiskalek, M. Jarvis [MNRAS 544:4288, arXiv:2508.03569]

RESEARCH EXPERIENCE

Unhooking the SPARC RAR Sep 2025 – present
University of Oxford – Astrophysics

Co-authors: Tariq Yasin, Harry Desmond, Richard Stiskalek, Matt Jarvis
(Paper in progress)

We investigate recent reports of hooks and bends in the **radial acceleration relation (RAR)** of galaxies in the SPARC dataset, which, if valid, would be devastating for modified inertia theories of gravity (e.g., MOND-MI). Specifically, we test whether such non-monotonicities can be removed by manipulating the SPARC error model.

- **Bayesian inference**, statistical analysis, galaxy dynamics, **MCMC (Python)**; familiarity with **Linux**.

A statistical analysis of Renzo's rule Jun 2024 – Sep 2025
University of Oxford – Astrophysics

Supervisors: Tariq Yasin, Harry Desmond
(Paper published in MNRAS)

We provide a systematic analysis of an astrophysical phenomenon known as **Renzo's rule**. Despite its validity being widely acknowledged, especially as supporting evidence for ΛCDM-alternative theories such as MOND, Renzo's rule is so far entirely informal, based largely on visual inspection of rotation curves.

- **Bayesian inference**, statistical analysis, **dark matter modelling**, galaxy dynamics.
- In **Python**: MCMC, Gaussian processes, dynamic time warping; familiarity with **Linux**.

Search for CP Violation in $\Lambda_b \to pK\mu\mu$ Decays Oct 2023 – Jun 2024
University of Warwick – LHCb group

Supervisor: Tom Blake

Using simulated events and Run II data from LHCb, we first extracted $\Lambda_b \to pK\mu\mu$ decays using machine learning tools in Python, then searched for potential **BSM CP-violation effects** by measuring the differences in Λ_b versus anti-Λ_b decays, taking into account detection and systematic errors.

- **Statistical analysis**, basic SM theory, **Python**, ML tools (XGBoost); simple usage of **Linux**.

Exploratory Study of $A \to H^+W^-$ decays in Type I 2HDM Jun 2023 – Sep 2023
University of Warwick – ATLAS group

Supervisor: Bill Murray

Using simulated events from DELPHES and ATLAS, we applied machine learning techniques to study **signal-background discrimination** and **mass regression** in $A \rightarrow H^{+}W^{-}$ decays, a CP-violating process predicted by certain extensions to the Standard Model of particle physics (two-Higgs-doublet models).

- ML techniques, e.g., **DNN, BDT**; data cleaning and analysis with **ROOT** (TMVA library in **C++**).

Growth and Investigation of Thin Epitaxial InBi Films Jul 2022 – Sep 2022
University of Warwick (Surface Group) & CY Cergy Paris University (ATTOLab)

Supervisors: Gavin Bell, Karol Hricovini

Using molecular beam epitaxy (MBE) at Warwick (with in-situ analyses), we attempted to grow a new quantum material, InBi in thin film epitaxial form, on a standard semiconductor InSb. We then analyzed electron band structures of cleaved bulk InBi with LEED and ARPES at ATTOLab, Paris.

- **Laboratory techniques** for surface growth and analysis (UHV, MBE, RHEED, XPS, etc.).

HONOURS AND AWARDS

Undergraduate Research Scholarship 2023
Warwick Undergraduate Research Support Scheme
Awarded £1500 to conduct a summer research project 'Exploratory Study of $A \rightarrow H^{+}W^{-}$ Decays in Type I 2HDM' with the ATLAS group at the University of Warwick.

Academic Performance Scholarship 2023
Department of Physics, University of Warwick
Awarded £100 as a "top-up" for my 2023 URSS project (total £1600) on the basis of academic merit. The department also sponsored my visit to CERN for the 2023 ATLAS Physics Week.

Undergraduate Research Scholarship 2022
EUTOPIA Undergraduate Research Support Scheme (EUTOPIA European University 2050 grant)
Awarded €1500 to conduct a summer research project 'Growth and Investigation of Thin Epitaxial InBi Films', travelling between the University of Warwick and ATTOLab in Paris.

TALKS, TEACHING AND OUTREACH

Oxford Summer Student Symposium Aug 2024
Presenter – Subdepartment of Astrophysics, University of Oxford

ATLAS Group Meeting Sep 2023
Presenter – Department of Physics, University of Warwick

Physics Society Revision Lectures Apr 2023 – Jun 2024
Lecturer – Warwick Physics Society

- *Courses taught: PX436 General Relativity, PX3A2 Quantum Physics of Atoms, PX262 Quantum Mechanics and its Applications, PX267 Hamiltonian Mechanics.*
- *I've also typed up some self-study notes on PX3A3 Electrodynamics over the 2023 summer, which are now published on the Warwick Physics Society website (sec. 1-4).*

ICUR Public Engagement Showcase Evening Sep 2022
Presenter – University of Warwick

International Conference for Undergraduate Research Sep 2022
Presenter – Panel Session 23C: Materials and Innovative Manufacturing