

Matthew Dunne

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EDUCATION

Trinity College Dublin

B.A. Moderatorship in Theoretical Physics

Final Degree Classification: 72% (First Class Honours)

Co. Dublin, Ireland

2021 - 2025

Ashbourne Community School

Leaving Certificate

Achieved 601/625 Points (Upper 4th Percentile Nationally)

Co. Meath, Ireland

2015 - 2021

RELEVANT EXPERIENCE

Hamilton Trust Summer Internship

Summer 2025

Engaged in a research project funded by the Hamilton Trust foundation culminating in a report titled “Solitons in Self-Dual Yang-Mills theory”. Investigated the emergence of soliton solutions in integrable models and compared SDYM solitons with other co-dimension 1 soliton solutions found in lower dimensional systems. Presented ongoing project work at regular seminars along with other students taking part in the programme.

Dissertation: Parisi-Sourlas Quantisation of Constrained Systems

2024 - 2025

Worked under the supervision of Dr. Chaolun Wu (TCD) to develop a method for obtaining covariant phase space path-integrals for constrained Hamiltonian systems. Conducted a literature review and research proposal to define the goals of the project. Applied the formalism to pure Yang–Mills theory, generalising BRST quantisation to systems with both first and second class constraints. Presented results at an end-of-year seminar and produced a poster for an open Q&A session.

Physics and Mathematics Tutor

2020-2021

Provided second-level mathematics and physics tutoring in my local area. Supplemented students' in-class learning with exam-focused problem-solving sessions using tailored revision material and written exam solutions to past problems. Developed pedagogical skills by delivering explanations of abstract concepts and identifying points of misunderstanding.

ACHIEVEMENTS

- Awarded financial support for the 2025 Hamilton Trust Summer Mathematics programme.
- Received an Award of Excellence for performance in the Leaving Certificate Examinations, Ashbourne Community School Graduating Class of 2021.
- Irish National Chess Community Games Runner-Up 2019
- Junior Golfer of the Year, Ashbourne Golf Club 2020

VOLUNTARY ROLES

Theoretical Physics Student Association

2022-2025

- Contributed to weekly seminars on a voluntary basis, providing assistance to students with previous

course content.

- Created lecture notes for graduate level modules where official materials were limited, helping improve the accessibility of complex topics for TPSA members.

Teaching Digital Literacy to the Elderly

2018-2019

- Hosted digital literacy tutoring sessions for elderly members of the community as part of a local initiative
- Provided guidance on using smartphones, tablets and laptops to communicate with others by email or social media.

FINAL YEAR COURSES

The following is a list of relevant course modules (each taught at graduate level) that were taken in the final year of my undergraduate degree.

- Quantum Field Theory
- The Standard Model
- Lie Groups, Lie Algebras and Physics
- Interacting Quantum Systems
- Differential Geometry
- Quantum Optics and Information

TECHNICAL SKILLS

- Programming: Python, Mathematica
- Typesetting & Academic Writing: LaTeX