Casey Farren-Colloty (21365022)

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1 Casey Farren-Colloty

Hi, my name is Casey although most people call me Cas
GitHub LinkedIn

Favourite Equation / Quote at the Moment

"...these lectures are about as theoretical as they come. We're not actually going to measure anything. Just pretend." - *David Tong*

There is an argument to be made that physics is at risk of becoming far too overly specialised. Indeed, this has been becoming a problem since the days of Fermi - as the last physicist to be considered both an experimentalist and a theorist. Though perhaps the advent of computational physics, allowing us to test theory in a way that was previously impossible, will allow for a new generation of physicists to be both theorists and pseudo-experimentalists. But this quote is also just funny.

2 About Me

"I'm a third-year theoretical physics student at Trinity College Dublin, driven by a deep curiosity to understand the fundamental principles that govern our universe as well as the application of those principles to the broader human society. I find areas that offer both profound insights into nature's workings and practical applications for a sustainable future particularly engaging. Beyond research, I'm passionate about making science accessible to everyone. As Seminar Director of the Theoretical Physics Student Association of Ireland and Director of The Problem Solving Association CLG, I'm involved in initiatives in science communication and education. From creating physics lecture series and teaching at the Centre for Talented Youth (CTYI) to working on projects

furthering democratic society through utilising physics-based techniques, I believe in sharing the problem-solving mindset of theoretical physics to address challenges across disciplines.

Research

2.1.1 2024 - Oxford University Internship

Selected for the prestigious Rudolf Peierls Centre for Theoretical Physics UROP, I investigated Renormalon effects in particle physics. Working under Prof. Gavin P. Salam FRS, Prof. Fabrizio Caola, Jack Oliver Helliwell, and Silvia Zanoli, I studied \(e^- e^+ \) annihilation events. My research focused on event shape observables, using the PanScales software to simulate electron-positron annihilation and analyze geometric properties of quark anti-quark pair events, including corrections for soft gluons and gluers.

Particle Physics Quantum Field Theory Numerical Methods

2.1.2 2023 - Electoral Redistricting Project

Democratic systems face a growing crisis of trust. This project tackles the challenge of fair electoral redistricting using computational methods from physics. Following a successful hackathon organized by TPSA and TCD's School of Mathematics, I developed a genetic algorithm approach to redistribute Irish electoral constituencies. This complemented a physics-based algorithm developed by RuaidhrÃŋ Campion, forming a comprehensive dual approach to electoral fairness. The work continues through The Problem Solving Association CLG, aiming to restore institutional trust through transparent, algorithmic solutions.

Computational Physics Social Systems Algorithmic Design

Teaching

I'm a firm believer of the importance of putting effort in to show the younger generation how interesting the world of science can be. As well as to show them that participating in this world is an achievable goal. The opportunity arose in the academic year 2023/24 to do just that and teach at the Centre for Talented Youth Ireland. Specifically, the 8-12 year old course. Here are some of the materials for these courses:

2.2.1 Superhero Science

Introduction to a variety of topics in science and engineering such as magnetism, genetics, and material science.

View Course Materials âĘŠ

2.2.2 Astronomy

Fundamentals of astronomy and related areas of physics. Topics included: Special / General Relativity, Stars, Galaxies, Stellar Evolution, and Rockets.

View Course Materials âĘŠ

Relevant Links

2.3.1 GitHub

Access my research code, teaching materials, and personal projects.

Visit Profile âĘŠ

2.3.2 The TPSA

Learn more about our current projects and more. Both from the Student Association and Non-Profit.

Visit Page âĘŠ

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