# Thomas Walker

Rice University

📞 07523101006

✉ thomas.mattia.walker@hotmail.co.uk

🔗 https://thomaswalker1.github.io/

## EDUCATION

**Doctor of Philosophy in Electrical and Computer Engineering** *January 2025 - Present*

*Rice University*

– Supervised by Professor Richard Baraniuk and focusing on machine learning.

**BSc Mathematics** *September 2021 - June 2024*

*Imperial College London*

– First Class Honours: 89% Final Grade

**A-levels** *September 2019 - June 2021*

*Reading School*

– Mathematics: A*, Further Mathematics: A*, Physics: A*, Extended Project Qualification: A*

## EXPERIENCE

**Research Assistant** *September 2024 - December 2024*

*Imperial College London - Dr Anthea Monod*

– Developing the use of tropical geometry to represent and investigate the properties of neural networks.

**Student Researcher** *June 2024 - September 2024*

*Helmhotz Munich - AIDOS Lab - Professor Bastian Rieck*

– Understanding how transformer models represent concepts in their latent representations.

**Student Researcher** *July - September 2023*

*Imperial College London - Safe Artificial Intelligence Lab - Professor Alessio Lomuscio*

– Investigating neural network generalization with a focus on PAC learning theory. Refined the evaluation of PAC bounds using testing certificates on regions of the input space.

**Student Researcher** *September - October 2022*

*Imperial College London - Dr Dean Bodenham*

– Investigating how programming languages (Python, R, C++) generate pseudo-random numbers. Developing a repository of functions to align pseudo-random number generators across languages.

**Data Consultant** *June - September 2022*

*BAE Digital Intelligence*

– Investigating project operations and developing strategies to improve resource utilization. Tasks involved working with database infrastructure (SQL, Java), AWS and developing a data dashboard in Python (Dash, Selenium).

**Website Administrator** *December 2021 - June 2024*

*Imperial Wiki Society*

– Working on a student-led initiative to develop an online platform to host supplementary material for modules taught at the university. Focusing on managing the project and developing resources for the mathematics modules.

## PAPERS

**Tropical Expressivity of Neural Networks** *October 2024*

*ArXiv Preprint*

**Tightening the Evaluation of PAC Bounds with Formulation Verification Results** *July 2024*

*ArXiv Preprint*

## AWARDS

**IBM Prize For Excellence In Pure Mathematics** *August 2024*

*Imperial College London Department of Mathematics*

– Awarded to a final year student of Mathematics in recognition of high academic achievement and excellence in Pure Mathematics.

**Dean's List for Academic Excellence** *August 2022/3/4*

*Imperial College London Department of Mathematics*

– Awarded to students to the top 10% in the year group for overall academic performance.

## PRESENTATIONS

**Using Region Tests to Evaluate PAC Bounds** *September 2023*
*Imperial College London - Safe Artificial Intelligence Lab Seminar*

**Jordan Algebras** *June 2023*
*Imperial College London - Group Research Project*

**Aligning Pseudo-Random Number Generation in Python, R and C++** *October 2022*
*Imperial College London - 3-Minute UROP Thesis Talk*

## FUNDING

**Graduate Fellowship** *January - December 2025*
*Rice University - Department of Electrical and Computer Engineering*

**Undergraduate Research Project Funding** *July - August 2023*
*Imperial College London - Department of Mathematics and Department of Computer Science*

## ARTICLES

**The Prime Minister's Mathematical Propositions** *July 2023*
*Imperial College London - Faculty of Natural Sciences Blog Post*

## WORKSHOPS

**AI Alignment** - BlueDot Impact *October 2024 - February 2025*

− A 12-week online course, covering a range of technical AI alignment research agendas. Involving an 8-week learning phase followed by a 4-week project phase.

**Spires** - Centre for Topological Data Analysis at the University of Oxford *August 2024*

− Bringing together leading researchers and young talent in the field of topological data analysis and cognate areas. With the applications of topological data analysis and the future of the field discussed.

**Human Aligned AI Summer School** - Centre for Theoretical Study at Charles University *July 2024*

− Four intensive days of talks, workshops, and discussions covering the latest trends in AI alignment research and broader framings of AI alignment research.

**Geometric Deep Learning** - Mathematics for Deep Learning *June 2024*

− A workshop summarising the recent advances in the field of geometric deep learning.

**X-Risk** - Global Challenges Project *May 2023*

− A workshop on investigating approaches taken to AI safety research.

**AI Safety Fundamentals** - Imperial Effective Altruism Society *October - December 2022*

− Comprised of eight group discussion sessions on the literature surrounding the concerns of powerful AI systems and the research on AI safety.

## VOLUNTEERING

**Treasurer** *October 2021 - July 2022*
*Imperial College London - Linstead Halls*

**Dog Fosterer** *May 2020 - August 2022*
*Royal Society for the Prevention of Cruelty to Animals (RSPCA), The Responsible Dog Rescue*

## TECHNICAL SKILLS AND INTERESTS

**Spoken Languages (Fluent)**: English, Italian
**Programming Languages (Intermediate)**: Python, Julia, Latex, Markdown
**Programming Languages (Basic)**: HTML, JavaScript
**Miscellaneous Qualifications** : Royal Life Saving Society National Pool Lifeguarding Qualification, Bronze Duke of Edinburgh
**Extracurricular Activities**: Tough Mudder 2021, Hyde Park Relay 2022, Rome Marathon 2024