

DARIO TRINCHERO

PhD Candidate in Mathematical Physics

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EDUCATION

Doctorate in Mathematical Physics

 Jan 2023 – present

 Stellenbosch University, ZA

Thesis: *New isomorphism between spaces of skeins & holomorphic sections in Chern-Simons theory*

Master's in Theoretical Physics

 Feb 2021 – Dec 2022

 Stellenbosch University, ZA

Thesis: *Pinhole interference in 3D fuzzy space*

Courses: Quantum information, relativity, solid-state physics

Honours in Mathematics

 Feb 2020 – Dec 2020

 Stellenbosch University, ZA

Mini Thesis: *Generalised Feynman formula for Ising model*

Courses: Quantum field theory, (functional) analysis

Bachelor's in Theoretical Physics

 Feb 2017 – Dec 2019

 Stellenbosch University, ZA

Majors: Physics, mathematics, abstract mathematics

Extra Courses:

- 3rd year: Algebra, logic, abstract mathematics
- 2nd year: Applied mathematics, abstract mathematics
- 1st year: Chemistry

Cambridge International AS- & A-Levels

 Jan 2015 – Nov 2016

 Somerset College, ZA

A-Levels: Mathematics, physics, computer science, chemistry

AS-Levels: English, Afrikaans

SKILLS & INTERESTS

Some of my broad interests, ranked by my aptitude in each:

Geometry

Quantum field theory

Programming

Quantum computing

Algebra

Topology

Lie theory

Teaching

Debating

Public speaking

Writing

Cyber-security

Graphic design

Category theory

I have been programming since 2011, and have a strong grasp of algorithms. I am comfortable with Unix and the following languages:

Python

C/C++

Java

x86 Assembly

Ruby

Octave

MATLAB

Mathematica

Web frameworks

TeX

Haskell (learning)

Rust (learning)

PROFILE

I am a passionate life-long student, with interests primarily in mathematical physics. My long-term dream is to pursue scientific research and lecture my field.

I love learning new skills, collaborating and sharing my knowledge with others. I am especially passionate about teaching, which I view both as an honour and a moral imperative. My knowledge and skills are products of a good deal of privilege, and it is by teaching a broad audience that I strive to pay this back.


Hobbies


I enjoy reading, trail-running, cooking, mushroom-hunting, and tabletop games, especially the abstract strategy game Hive.


Citizenship


I am a dual citizen of South Africa and Italy.

KEY ACCOLADES

 Globally-competitive results in university courses, A-Levels, and SAT tests


 Numerous awards from Stellenbosch University and associated institutions


 Graduated all degrees *cum laude*, including being top of my undergraduate class

 Author of academic research published in well-known journals


REFEREES


Dr Bruce Bartlett (Hons & PhD supervisor)

 bbartlett@sun.ac.za


 Mathematics department
Stellenbosch University, South Africa


Prof. Frederik Scholtz (MSc supervisor)

 fgs@sun.ac.za

 Physics department
Stellenbosch University, South Africa

Dr Johannes Kriel (MSc examiner)

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 Physics department
Stellenbosch University, South Africa

RESEARCH OUTPUT

Journal Articles

- **D. Trincherro** and F. G. Scholtz, "Pinhole interference in three-dimensional fuzzy space," *Annals of Physics*, vol. 450, p. 169 224, Mar. 2023, ISSN: 00034916. DOI: 10.1016/j.aop.2023.169224.

Theses

- **D. Trincherro**, "Pinhole interference in three-dimensional fuzzy space," M.S. thesis, Stellenbosch University, Mar. 2023. DOI: 10019.1/126944.

Seminars & Colloquia

- **D. Trincherro**, *Pinhole interference in 3d fuzzy space*, Room 316, Syracuse University, Sep. 2023. [Online]. Available: https://video.syr.edu/media/t/1_74dkljg (visited on 09/02/2023).
- **D. Trincherro**, *Computing by collapsing*, Cosmic Conversations, Stellenbosch University, Apr. 2022. DOI: 10.5281/zenodo.8228648.
- **D. Trincherro**, *Exploring tensor products*, SUMS, Stellenbosch University, May 2021. DOI: 10.5281/zenodo.8228612.

ACHIEVEMENTS

2021–2022: Master's in Physics

- 100% for 1 of 3 modules; median mark of 97%; 89% for thesis
- Bursaries: Harry Crossley Foundation & Skye Foundation

2020: Honours in Mathematics

- 100% for 1 of 11 modules; median mark of 94%; 95% for mini thesis
- Dean's Medal: highest faculty average across 4 years of study
- Attended Perimeter Institute of Theoretical Physics' summer program
- Bursary: National Research Foundation

2017–2019: Bachelor's in Physics

- 100% for 16 of 37 modules; median mark of 99%
- Rector's Award: among top students of faculty
- Rubbi Book Prize: top Mathematics student (2018, 2019)
- Top Computer Science & Applied Mathematics first year
- First Year Achievement Awards: among top first year students
- Winner (in team): South African Mathematical Modelling Contest (2018)
- Second place (in team): SANReN Cyber Security Challenge (2018)
- Bursary: Stellenbosch University Merit Award (2018, 2019)

2015–2016: Cambridge AS- & A-levels

- Dux scholar: Somerset College (Cambridge curriculum)
- Highest mark globally: AS-level Mathematics
- Highest mark in South Africa: AS-level Chemistry
- Perfect SAT scores (800) for Physics & Mathematics subject tests; score of 1530/1570 for general SAT (with essay)
- A* ("A-star") grade in all A-levels
- Winner (in team): SA National Schools Debating Championship; placed 10th individually
- Finalist: SA Mathematics & Computer Programming Olympiads
- Scholarship (Rhodes University): gold medal in De Beers English Olympiad

EMPLOYMENT



Mathematics Course Assistant

 Feb 2018 – present  Stellenbosch University, ZA

I have tutored the following undergraduate classes (starred are those I currently teach):

- *3rd year:* Algebra*, Fredholm theory
- *2nd year:* Linear algebra*, advanced calculus*, analysis*
- *1st year:* Linear algebra, calculus

Software Development Engineer Intern

 Nov 2019 – Feb 2020  Amazon Web Services, ZA
Dec 2020 – Feb 2021

I interned twice for *Amazon Web Services* (AWS) where I worked on *Elastic Compute Cloud* (EC2).

Private Tutoring

 Aug 2017 – Mar 2018  Independent, *ad hoc*

Grade 11–12 mathematics, both national curriculum & advanced programme mathematics.

PERSONAL PROJECTS

Course Enrichment for 2019

- I attended an Honours-level course on *Lie theory*, which I applied to Hydrogen-atom physics as part of my 3rd-year abstract mathematics project.
- I attended a fluid dynamics course in my spare time.

Global Game Jam & Other Development

- Since 2019, a friend and I have partaken in the annual *Global Game Jam*, wherein participants have 3–5 days to design & build a computer game from scratch.
- Having started with no knowledge in *Unity*, *Godot*, *C#*, or game design, this was a rapid learning experience.
- We have independently created several game prototypes since, including a web version of *Hive* (see my GitHub).

Algebra & Geometry Investigation

- I spent the holiday of 2017–2018 independently working through every page & exercise of Alan Beardon's wonderful book, *Algebra and Geometry*.
- As my introduction to abstract mathematics, it now holds a special place in my heart.

Project Euler Problems

- An ongoing project of mine (since 2015) is completing programming challenges from the *Project Euler* database.
- These challenges demand mathematical proficiency & creativity to solve in the permitted 1min run-time.