

# 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](mailto:bbartlett@sun.ac.za)


 Mathematics department  
Stellenbosch University, South Africa


### Prof. Frederik Scholtz (MSc supervisor)

 [fgs@sun.ac.za](mailto: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. Trincherio** 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.

### Seminars & Colloquia

- **D. Trincherio**, *Introduction to quantum groups*, Stellenbosch University, Oct. 2023. DOI: 10.5281/zenodo.10000346.
- **D. Trincherio**, *Pinhole interference in 3D fuzzy space*, Room 316, Syracuse University, Sep. 2023. [Online]. Available: [https://video.syr.edu/media/t/1\\_74dkljgj](https://video.syr.edu/media/t/1_74dkljgj) (visited on 09/02/2023).
- **D. Trincherio**, *Tour of knots & theta functions*, Stellenbosch University, Oct. 2023. DOI: 10.5281/zenodo.10047936.
- **D. Trincherio**, *Computing by collapsing*, Cosmic Conversations, Stellenbosch University, Apr. 2022. DOI: 10.5281/zenodo.8228648.
- **D. Trincherio**, *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
- Perimeter Institute for Theoretical Physics: attended 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.