# DARIO TRINCHERO

**PhD Candidate in Mathematical Physics**


Cape Town, South Africa | dario.trinchero@pm.me | +27 79 601 4999 | ID: 9805065082086
dariotrinchero.github.io | 0000-0001-8015-3987 | dariotrinchero | dariotrinchero


## 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, cooking, trail-running, rock-climbing, 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)**
hkriel@sun.ac.za
Physics department
Stellenbosch University, South Africa

# RESEARCH OUTPUT

## Journal Articles

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

Feb 2024 – Jul 2024 | Stellenbosch University, ZA

I lectured calculus to a class of around 220, and set tutorial & exam questions.

## Mathematics Course Assistant

Feb 2018 – Dec 2023 | Stellenbosch University, ZA

I tutored the following undergraduate classes:

- *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
Dec 2020 – Feb 2021 | Amazon Web Services, ZA

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

### Game Development (ongoing)

- Annually (since 2019), a friend and I partake in the *Global Game Jam*, wherein participants have 3–5 days to design & build a computer game from scratch.
- Having started with no experience in art, sound design, or game development in general, this was initially a rapid learning experience.
- We have since also independently created several game prototypes, including a web version of Hive (see my GitHub).

### *Project Euler* Problems (ongoing)

- 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.

### Enrichment Courses (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.

### Algebra & Geometry Investigation (2017–2018)

- 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.