Robert Andrew Spencer

Personal Data

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Selected Work Experience

2023 – now — **Quantitative Developer**
— **Man Group (AHL)**
Portfolio Management (Analytics) team

2022 – 2023 — **Quantitative Analyst**
— **Squarepoint Capital**
Strategy-level analytics and metrics | novel strategy sizing and implementation | framework development for novel asset classes

2018 – 2023 — **Teaching**
— **DPMMS Cambridge**
Undergraduate Supervisions

2019 — **Contract Software Developer**
— **Kopernio (now EndNote Click)**
Fault Detection Data Analysis
Machine learning for fault detection and prediction

2017 — **Software Development Intern**
— **Facebook (now Meta)**
Android UI Systems (Litho)
Library performance profiling | open-sourcing operations | repository manipulation and secret removal | sample Android project development (conception to implementation)

2015 — **Software Development Intern**
— **Amazon Web Services**
Placement team
Fault detection and monitoring | wrote and documented service in ruby | integrated with S3 and alert tools | deployed through CI across multiple data centres

Education

2023 PhD in Pure Mathematics
from the **University of Cambridge**.

2018 MASt in Pure Mathematics
from **University of Cambridge** *awarded with distinction.*

2016 B.Sc. (Hons) (Mathematics)
from **University of Cape Town** *awarded first class.*

2015 B.Sc. (Mathematics, Applied Mathematics and Physics)
from **University of Cape Town** *awarded with distinction in Applied Mathematics, Mathematics, Physics and the degree with distinction.*

Computer Skills

My daily driver is Ubuntu Linux and I write most of my current personal projects using Rust or Python. In previous employment I have used:

Languages	Rust, Python, C, SQL, HTML, CSS, Java, bash, Delphi Pascal, Mathmatica, KDB/q
Skillsets	Algorithm design/analysis, system administration, embedded development
Applications	git, LaTeX, Adobe Audition

Publications and Preprints

My research is in abstract algebra, where we study mathematical structures and attempt to break them down into their smallest constituent components, before studying how these components "glue" together to form the original object. I focused on the Modular Representation Theory of finite algebras, with a focus on diagram algebras. My PhD was supervised by Prof Stuart Martin.

2022 **Cell Modules for type A Webs** — under consideration
We examine the cell modules for the category of type A_n webs and their natural cellular forms. We calculate the Gram determinant of these forms and prove a conjecture due to Elias.
Stuart Martin and R. A. Spencer arXiv:2210.09639

(ℓ, p)–Jones–Wenzl Idempotents — Journal of Algebra 603
We extend the results of Burrull, Libedinsky and Sentinelli to determine the idempotents describing the projective cover of the trivial Temperley–Lieb module in mixed characteristic.
Stuart Martin and R. A. Spencer 10.1016/j.jalgebra.2022.03.022

2021 **Non-induced Modular Representations of Cyclic Groups** — Communications in Algebra 52
We compute the ring of non-induced representations for a cyclic group, C_n, over a field and show that it has rank $\varphi(n)$ — regardless of the characteristic of the field.
Liam Jolliffe and R. A. Spencer 10.1080/00927872.2023.2301057

Modular Valenced Temperley-Lieb Algebras
We determine the structure and representation theory of certain valenced Temperley-Lieb algebras by studying their cellular data in positive and mixed characteristic.
R. A. Spencer arXiv:2108.10011

2020 **The Modular Temperley–Lieb Algebra** — Rocky Mountain Journal of Mathematics 53
We study diagrammatic representations of the Temperley–Lieb algebras over positive characteristic to derive the decomposition numbers and the dimensions of simple modules.
R. A. Spencer 10.1216/rmj.2023.53.177

School Competitions and Olympiads

2012, 2013 International Olympiad in Informatics
Bronze medal 2013

2011, 2012 International Mathematics Olympiad
Honourable mentions

2016, 2017 NSUCRYPTO International Students' Olympiad in Cryptography
Winner 2016; runner-up 2017

2015, 2016 ACM International Collegiate Programming Contest
National team

2013, 2014 International Mathematics Competition
Second prize 2014; honourable mention 2013

2009 – 2012 South African Computer Olympiad
Winner 2012; Bronze meal 2010–2011; top ten 2009

2009, 2012 South African Mathematics Olympiad
Winner 2009; Runner-up 2012

2008 – 2012 UCT Mathematics Competition
Winner 2008, 2012; top ten 2009–2011

2014 – 2016 Standard Bank IT Challenge
Winning national team 2015, 2016; winning provincial team 2014

2013 South African Tertiary Mathematics Olympiad
Winner

Interests and Activities

Archery; Programming for fun; Piano; Electronics; Hiking; Terrarium building; D&D; Science Communication