

JOHN BENJAMIN MCCARTHY MPhil PhD

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EDUCATION

- Imperial College London** — PhD in Pure Mathematics 2018-2023
Thesis: *Stability conditions and canonical metrics*
Supervised by Fields Medalist Sir Simon Donaldson. Research focused on developing new mathematical formalism for describing D-branes in Type IIB Superstring theory. Accessible at jmccarthy.au/thesis.
- The University of Adelaide** — M.Phil. in Pure Mathematics 2017-2018
Thesis: *Hitchin's Projectively Flat Connection and the Moduli Space of Higgs Bundles*
Awards: University Master by Research Medal (2 awarded per year across whole university)
- The University of Adelaide** — B.M.CS. Major in Pure Mathematics (7/7 GPA) 2014-2016
Awards: Prize for highest grade in year across all courses (2015 & 2016)

PROJECTS

- MathsGenealogyAPI** — Backend — Java, Spring Boot, Docker, PostgreSQL — [Github](#) 2024
- ▶ Exposes the [Maths Genealogy Project](#) to an API which returns requested family trees.
 - ▶ Scrapes data recursively using JSoup and caches it for later API calls. Native PostgreSQL recursive queries allow the relational database to act as an efficient graph database.
- MathsGenealogyGraph** — Frontend — TypeScript, React, d3.js — [Github](#) — [Try it out!](#) 2024
- ▶ Frontend for MathsGenealogyAPI written in TypeScript and React using the d3.js data visualization library to produce interactive graphical representations of genealogical family trees.
- ReactChess** — Frontend — Kotlin, React — [Github](#) — [Try it out!](#) 2023
- ▶ Chess implementation developed in Kotlin. Playable chess board made with React and Kotlin/JS.
 - ▶ Board representation using bitboards and move generation using “fancy magic bitboards.”
- Lightweight seminar website** — Front and backend — PHP, HTML/CSS, JavaScript — [Github](#) 2021
- ▶ Minimalist content management system to allow non-technical users to maintain an academic seminar announcement blog. Was utilised for several years by Imperial College Junior Geometry seminar.
 - ▶ Custom database system with XML file to run on academic web servers with no SQL functionality.

EXPERIENCE

- Researcher in pure mathematics** 2017-2023
- ▶ Worked on research problems independently, demonstrating excellent ability to absorb new ideas, iterate on existing techniques and develop new techniques to solve technical problems.
 - ▶ Worked on research problem in collaboration, involving frequent and effective communication of highly technical concepts, identification and resolution of precise technical details in a team.
- Freelance web developer** 2012-2013
- ▶ Worked on development of online coupon/deals website in team of 2. Frontend marketplace and backend in PHP/MySQL with PayPal integration for payment.
 - ▶ Maintained online stores for local sports goods retailer and for local boutique clothing seller.

TECHNICAL SKILLS

- Languages Fluent in: Java, Kotlin, SQL, PHP, JavaScript, TypeScript, HTML/CSS, \LaTeX
Some experience in: C++, C#, Python/Sage, Rust
- Frameworks/Tools React, Kotlin/JS, PostgreSQL, d3.js, Unit testing, Test Driven Development, Functional programming, Scientific programming, Spring (Boot), IntelliJ, Docker
- Communication Skills Excellent written and verbal communication skills, especially technical communication. Spearheaded small scale technical working groups (research) and managed multiple technical seminars (Junior Geometry Seminar, Research working group seminar).
- General Skills Excellent research and independent working skills. Capable of rapid adoption of new concepts and technology