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Luke Naylor

Experience

2020–2024 **University Tutor**, *School of Maths and Usher Institute*, University of Edinburgh

Part-time approx. 600hrs **alongside PhD**.

- **Accredited** "Associate fellowship of the higher education academy".
- Tutored in courses teaching **Git**, **R**, **Python**, **pandas**, and **NumPy/SciPy**.
- Built **Docker containers** for the student development environment and integrated with GitHub **Codespaces** as part of an **accessibility** project for course.
- Involved with **auto-grading** system for course, **reducing workload** for markers.
- Created **teaching material** related to using **debuggers**.
- Ran course promoting tech literacy to mathematics graduates.

2019–2020 **Systems Software Engineer**, *Micro Focus*, Newbury, 1 year

Permanent position in 'core-tech' team working on **COBOL** compiler.

- Refactored **test coverage** utility to produce web report fitting company branding.
- Updated and **document** internal **API changes**.
- **Communicated** with pre-sales team to clarify details in **compiler behaviour**.
- **Improved CI** to ensure product **compatibility** with all **customer** C compilers.
- Technologies used: **SVN**, **COBOL**, **C**, **C++**, **awk**, **sed**, **batch**, **ksh**.

2017 Jul–Aug **Summer Student**, *Perm State University*, Russia

2 month summer course in computational fluid dynamics.

- Finite difference methods for PDEs, implementated in **Fortran**.
- Parallelization with **OpenMP** and **MPI**.
- Industry and academic software (**Ansys** and **OpenFOAM**).

Summers 2018/9 **Residential Advisor**, *Hertford College*, Oxford

Day to day helper for international summer school students.

Software Projects

`zed-latex`[8] **LaTeX extension for the Zed editor**

Main contributor on extension with around **125k downloads**. **Rust** compiled to **WASM**.

`TeXpresso-LSP`[7] **Language server for live LaTeX rendering**

Wraps around existing experimental preview as you type project "TeXpresso" to allow **LSP**-enabled editors to use the technology. Involving changes to **C** codebase, along with **TypeScript** language server. Complemented with Zed extension[6].

`TeXpresso fork`[5] **Modern C++ rewrite project**

Personal educational fork of a **C codebase** which the above language server wraps around. **Incremental** rewrites of specific files to **modern C++** for a real world feel of using the newer standards (up to C++23).

`tilt-rs`[1] **Rust crate to expose computation from PhD thesis**

Computation library and executable central to PhD thesis, multiple orders of magnitude faster than pre-existing implementation.

`tilt.leptos`[3] **WASM WebApp to expose part of PhD**

Fine-grained reactive **WebApp** powered by the Rust crate above using **Leptos**.

`pseudowalls`[4] **Python/SageMath library related to PhD**

Symbolic computations library related to the pure mathematics in my PhD thesis.

Misc. open-source
I proactively submit PRs to repos for minor features or bug fixes. These include: zed, leptos, nvim-treesitter, tree-sitter-latex, zed-make, zed-docker-compose, zed-sagemath, and stability_conditions.

Education

University

2020–2025 **PhD in Mathematics**, *University of Edinburgh*, *Minor corrections*

Title: *"Criterion for the accumulation of ν-walls"*[2], supervised by Prof. Antony Maciocia, in the area of algebraic geometry.

- Optimised performance on **computational problem** by multiple **orders of magnitude**.
- Theoretical **research** results about walls of **Bridgeland stability** conditions on surfaces.
- Thesis includes content **automatically generated** by computer algebra, with the associated **Jupyter notebooks** seamlessly included in the appendix.
- Explored **Lean3/4** for **theorem proving**. Involved in project testing the feasibility for a Lean4 game teaching students topology.

2018–2019 **Masters in Mathematics**, *University of Oxford*, *First Class*

2015–2018 **Bachelors in Mathematics**, *University of Oxford*, *First Class*

Specializing mostly around algebra, analysis, geometry and topology.

- Nathan Prize for yr 3 results (from University College)
- **Scholar** year 3 onwards (Exhibitioner year 2)
- Maths week prize (from University College introduction week)

High School

A-levels Mathematics (A*), Further Mathematics (A*), Physics (A), Computing (A)

School The Cherwell School Academy

Achievements
- Distinction in British Maths Olympiad (BMO) round 1
- Silver Crest Award (for $\mathrm{H_2O}$ molecule computer simulation)
- Grade 1 in STEP I and II
- Copper Award in Cambridge Chemistry Challenge
- Bronze Award in International Chemistry Olympiad

Computing Coursework
Built website for a small business (`www.clockworkmusic.com`). This involved **HTML**, **LESS/CSS**, **Coffeescript**, **PHP**, **MySQL**, and the **Google Maps API**.

Links

[1] *Computing pseudowalls (Rust crate)*. `https://gitlab.com/pseudowalls/tilt.rs`.

[2] *Criterion for the accumulation of ν-walls (PhD thesis)*. `https://era.ed.ac.uk/handle/1842/43553`.

[3] *Pseudo-wall finder (WebApp)*. `https://lukideangeometry.xyz/pseudowalls`.

[4] *pseudowalls (Python lib)*. `https://gitlab.com/pseudowalls/pseudowalls`.

[5] *TeXpresso fork*. `https://github.com/lnay/texpresso`.

[6] *TeXpresso Zed extension*. `https://zed.dev/extensions?query=texpresso&filter=language-servers`.

[7] *TeXpresso-LSP*. `https://www.npmjs.com/package/texpresso-lsp`.

[8] *zed-latex*. `https://zed.dev/extensions?query=LaTeX&filter=language-servers`.