

# Lachlan Marnham | Curriculum Vitae

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## At a Glance

I am a backend software engineer with a focus on the design and implementation of services in the cloud. My background is in theoretical physics and the video-conferencing industry. I aspire to be the kind of specialist who is capable of proficiently building technologies outside of my speciality.

- **Primary Language:** Python
- **Other Languages:** SQL, Go, JavaScript, HTML, CSS
- **Process:** Linux, git, unit testing, system testing, continuous integration, code review
- **Communication:** Journal publication,  $\text{\LaTeX}$ , magazine writing, university teaching, conference presentation
- **Spoken Language:** English (native proficiency)
- **Citizenship:** Irish and Australian (dual citizenship)

## Experience

- **StarLeaf** **London, UK**  
*Software Engineer* *April 2017–present*
  - **Backend Engineering of a Cloud Videoconferencing Platform**
  - **Skills Developed:** Python, SQL, JavaScript, HTML, CSS, RESTful API design, distributed systems engineering, service architecture design, unit and system testing, development of a multi-versioned cloud infrastructure, continuous integration, software planning and specification, test plan writing and working with large and complex code bases.
  - **Achievements:**
    - Designed and built a bespoke infrastructure system-testing platform. This involved the remote control of virtual StarLeaf video conferencing and instant messaging clients to probe a cloud with dozens of constituent server species.
    - Implemented a distributed, co-located database and database-control infrastructure for the storage and pipelining of customer product-usage data. This system was written in such a way so as to allow for customer data to be stored in a jurisdiction of their choice, while enabling the data to be accessed transiently by credentialed team members. I also worked on a suit of internal tools for the categorization and display of this information.
    - Developed a platform which serves dashboards to customers, allowing them to view product-usage statistics in real time.
- **University of Exeter** **Exeter, UK**  
*Doctoral Researcher* *April 2012–2016*
  - **Low-dimensional Condensed Matter Field Theory and Applications**
  - **Skills Developed:** Python, Mathematica, computational mathematics, pair programming, code review, version control, complex analysis, field theory, graph theory, group theory, multivariate calculus, linear algebra, topology and academic communication (conference speaking, publication in journals, teaching, writing textbook reviews and so on).
  - **Achievements:**
    - Developed a mathematical and conceptual framework for the formation of particles composed of electron pairs in certain low-dimensional systems.
    - Published in peer-reviewed journals.
    - Taught a variety of problems classes and tutorials in physics and mathematics.
    - Won two research prizes, and was twice nominated for a graduate teaching prize.

## Education and Research

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- **University of Exeter** **Exeter, UK**  
PhD Theoretical Physics  
Graduated December 2016 2012–2016
- **University of Wollongong** **Wollongong, Australia**  
Honours Year (Masters), Physics, 1st Class Honours, Distinction 2011–2012  
Dissertation grade: 96% – Overall Masters Grade: 93%
- **University of Wollongong** **Wollongong, Australia**  
BSc Advanced (Physics), 1st Class Honours, Distinction 2008–2012  
Degree Average: 87%

### Major Research Projects.....

- **Doctoral Project:** ‘Anomalous Electron Pairing in Graphene’
  - Computational work performed mostly in Python (some Mathematica) with NumPy and SciPy, with all coding and algorithm design developed from scratch.
  - Development and application of novel low-dimensional quantum condensed-matter field theories to the study of mesoscopic systems.
  - Lead to the proposal of a new kind of (quasi)particle in graphene
- **Masters Project:** ‘Energy relaxation rate of an external electron due to plasma oscillations in a 2DEG with Rashba spin–orbital coupling’, Dissertation grade: 96% – Overall Masters Grade: 93%
  - All code developed from scratch in C++
  - This work studied electron transport normal to semiconductor heterojunctions with Rashba spin-orbit coupling
  - Applications in the area of energy loss in spintronic nanostructures

### Publications.....

- **Metastable electron–electron states in double–layer graphene structures**  
[arXiv:1410.0864v2 \[cond-mat.mes-hall\]](#)
- **Bielelectrons in the Dirac sea in graphene: the role of many–body effects**  
[arXiv:1512.02953 \[cond-mat.mes-hall\]](#)

## Open Source

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### Major Contributions or Sole Contributor.....

- **Anarxiv:** The initial phase of this project, which I am working on with two co-founders, is an interactive feedback platform which sits on top of the Arxiv pre-print repository. Our long-term goal is to build it out into an open source, free-to-publish *and* free-to-read academic journal.
- **Partita:** Musical instrument practice assistant, incorporating progress tracking and spaced repetition, metronome and tuner. Currently for desktop, but will eventually ship as a web app.
- **Lethe:** A stateless, deterministic password manager. Generates strong passwords at run time, and doesn’t store them *anywhere*, but generates the same passwords with every use.

### Just Helping Out.....

- **Sucuri:** A HTML templating engine.
- **tldr:** Simplified man pages which only list the few use cases the user is most likely to need.

## Honours and Awards

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- **Exeter Students’ Guild Teaching Awards** (twice nominated) “Best Graduate Teaching Assistant”
- **University of Exeter Early Careers Network Poster Prize** (2015)
- **Europhysics Letters Prize** (2013) “In recognition of the best presentation at GrapheneWeek 2013”
- **College Research Studentship** (2012–2016)
- **Physics Engineering Discipline Prize** (2010, 2011 and 2012) “For best performance in physics”
- **University of Wollongong Dean’s Merit List** (2010, 2011 and 2012)
- **Kittel–Lewis Prize for Solid State Physics** (2011) “For best performance in Solid State Physics”