Leon Baiyu Shen Williams

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I am an experienced engineer and researcher, having graduated in **Integrated MSci Chemical Physics with Work Placement** with **first-class** honours, from the University of Glasgow, with a strong skillset in **chemistry, physics, and programming**. I have **experience** in broad **scientific and engineering research environments,** having spent time working at **esteemed institutions** such as **the European Space Agency, Diamond Light Source synchrotron and at Sonomatic Ltd**. I have experience spanning novel **guidance and navigation algorithms for lunar landing**, **advanced chemical analytical** and **ultra-high vacuum** techniques, and applying **machine learning** to optimising integrity testing systems**.**

Education

2018 – 2023 Integrated MSci Chemical Physics - University of Glasgow, Scotland

Grade: First Class

Key Modules: Quantum Information, Quantum Mechanics, Nuclear Physics, Particle Physics, Atomic Systems, Electromagnetic Theory, Mathematical Methods, Thermal Physics, Solid State Physics, Physical Chemistry, Inorganic Chemistry, Organic Chemistry, Quantum Chemistry

2012 – 2018 - James Gillespie's High School

Advanced Higher: Mathematics (A), Physics (A), Chemistry (A)
Higher: Mathematics (A), Physics (A), Chemistry (A), Computing (A), Biology (A)
National 5: Maths (A), Phys (A), Chem (A), Comp (A), Bio (A), Geo (A), French (A), Eng (A)

Technical Skills

My physics labs were based around developing experimental methodologies:

- Applying **critical thinking and problem solving** to understand, design, execute, and evaluate in-depth experiments (e.g. Laser Interferometry, Polarisation, ESR, NMR, XRD).

Programming proficiencies:

- **C, Python, JavaScript, FORTRAN** and **MATLAB**.
- **SQL**, **HTML** and **CSS**, **LiveCode** and **project methodologies** (**Agile, CD**).
- **Windows** and **Unix-based** operating systems.
- **Machine Learning & Optimisation** (Particle Swarm, Genetic Algorithm, Gradient Descent)
- **Docker**, **GitHub**, **Linux**, **high performance computer clusters**.

Practical Techniques:

- **Chemical analytical** (IR/NMR/UV/Vis/X-ray Spectroscopy, Mass Spectrometry, STM)
- **Synchrotron X-ray and Electron Diffraction** techniques (XSW, LEED, ARPES, PhD)
- **Ultra-high vacuum** systems.

Research Experience

Graduate Researcher – European Space Agency, ESTEC Sep 2024 - Apr 2026

- Designed research topics, shortlisted and interviewed candidates for future researchers in team.
- Carried out research and brainstorming as ESA think tank on a number of future topics for future research including space based data-centres, sun-shading, the future of AI in space.
- In collaboration with iSpace Japan, developed vision navigation algorithms for future lightweight lunar landers.
- Various projects involving AI, evolutionary robotics, soft robotics.
- Studied and developed algorithms for resilient adaptive robotic structures with additional collaboration with EPFL and Cambridge University
- Created template solutions and supported the running of international open competition of event-based vision navigation (ELOPE)
- Wrote a number of papers (see below) on the work achieved during my time in the team.

Machine Learning Software Engineer – Sonomatic Limited, Aberdeen Mar - Sep 2024

- Designing **high volume data pipelines** from pre-existing MATLAB and Python systems.
- Developing **convolutional neural networks** for image recognition.
- **Investigating potential applications of machine learning** in the product workflow
- Collaboration with data and engineering teams.
- Created and taught machine learning course for graduates.

Year in Industry Work Placement – Diamond Light Source Ltd, Oxford Sep 2021 – Sep 2022

- Studied 2D materials including Graphene, and Graphene-like films in **ultra-high vacuum** (UHV) at the **Diamond Light Source synchrotron**.
- **Chemical surface synthesis techniques** (e.g. epitaxial growth), **analysis techniques** including **X-ray and electron diffraction and spectroscopy, and microscopy.**
- Developed an **automated data analysis script** for XSW experiments.
- **Mathematical modelling of chemical structures for simulations.**
- Utilised scripting for **automated data acquisition** through instrument control using **Jython.**
- High level data analysis involved **Python**, its associated libraries, and **MATLAB**, as well as **FORTRAN** for **X-ray scattering calculations**. Optimised using **particle swarm optimization** methods (PSO) run on the STFC **high performance computing cluster.**
- Balanced a workload of group and independent projects.
- Carried out **research collaboration** with/on behalf of groups in **international** universities including the Technical University of Munich**.**
- Involved in **customer-facing tours** of the facility and **mentorship programme**.
- Acquired technical skills for the **construction, mounting**, and **setup** of **UHV equipment**.

Masters Thesis: Econophysics: Agent-based modelling of markets from kinetic theory of gases and Brownian motion Sep 2022 – Apr 2023

- **Applied physics concepts** to study economic systems through **agent-based models**.
- Compared **kinetic theory of gases and Brownian motion** to individual interactions in markets through simulation of these agent-based models.
- Developed and adapted these models to produce emergent phenomena resembling economic systems, such as wealth distributions and stock price fluctuations.
- Using **JavaScript** to visualise results on a **webpage**.
- Software was developed in **Python** and **JupyterLab** paired with **GitHub** and **Docker**.
- Incorporated a range of libraries including **mesa-ABM, Scipy, Seaborn, Matplotlib, and Pandas** alongside standard **software development practices**.

Publications: *Polycyclic aromatic hydrocarbons for graphene growth on Cu(111) – Appl. Phys. Lett. (2022),*
Adsorption structure of Iron Phthalocyanine and Titanyl Phthalocyanine on Cu(111) – Inorganica Chimica (2023),
Probing the role of surface termination in the adsorption of azupyrene on copper – Nanoscale (2024)
One-step synthesis of graphene containing topological defects — Chemical Science (2025)
Vision-guided optic flow navigation for small lunar missions — Astrodynamics (2026)
Event-based lunar optical flow ego motion estimation challenge — Nature Space Exploration (2026)

Other Experience and Extra-curricular activities

Camp Counselor - American Youth Foundation Jun – Sep 2019
Research Assistant Placement at Edinburgh Royal Observatory Nov – Dec 2017
Men's Captain - Glasgow University Ultimate Team April 2020 – April 2021

- Led a 100+ person sports club through novel challenges posed by the pandemic.

Home Projects Apr – Sep 2020

- **Self-directed** and **curiosity-driven** study during interruption of formal education (COVID).
- Completed challenging projects such as reverse-engineering hardware (modifying Raspberry Pi, repurposing IR receiver from an old TV and repairing various technology), electroplating jewellery, heat treatment and hand crafting complex knife handles.
- Employed practical skills including soldering and working with circuits and metal/woodwork.

Hobbies and Achievements

2023 Represented GB at the World under-24 Ultimate Championships finishing 6th.
2023 Cycled through the Swiss Alps on 2-week bikepacking trip.
2022 Competed at the World Ultimate Club Championships in Cincinatti, USA.
2019 American Red Cross Adult and Pediatric First Aid/CPR/AED certificate.

Hobbies Ultimate Frisbee, Photography, Travel, Bikepacking, Art, Piano, and Videography

Languages: English (Native), Mandarin (Spoken), French (National 5)