Leon Baiyu Shen Williams

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I am a recent Integrated **MSci Chemical Physics with Work Placement graduate** with **first-class** honours, from the University of Glasgow, with a strong skillset in **physics, programming, and chemistry**. I have **experience** in **international scientific research,** having spent a year **working at the Diamond Light Source synchrotron**, carrying out **advanced chemical analytical** and **ultra-high vacuum** techniques, and **data analysis/acquisition.** Furthermore, I have practical experience in **programming**, through my master's project, building and implementing **agent-based models** in **Python** to study economic systems through physics concepts. I am currently consolidating my **software development skillset** through independent study of key concepts including: **documentation, system architecture, machine learning, and cloud computing.**

Research Experience

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 interactive results on a **webpage**/**server**.
- 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**.

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.**
- **Data analysis** for these techniques, often **extracting signals from raw instrument data.**
- 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**.

Publications: *Using polycyclic aromatic hydrocarbons for graphene growth on Cu(111) under ultra-high vacuum – Appl. Phys. Lett. 121, 191603 (2022),*
Adsorption structure of Iron Phthalocyanine and Titanyl Phthalocyanine on Cu(111) – Inorganica Chimica Acta 557, 121679 (2023),
Probing the role of surface termination in the adsorption of azupyrene on copper – Nanoscale (Pending Revision)

Education

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

Grade: First Class

Relevant Modules: Nuclear & Particle Physics, Quantum Information, Atomic Systems, Electromagnetic Theory, Mathematical Methods, Quantum Mechanics, Thermal Physics, Solid State Physics

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 have been based around developing general experimental problem-solving:

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

Developing programming proficiencies:

- **C, Python, FORTRAN** and **MATLAB**.
- **LiveCode**, **SQL**, **HTML** and **CSS**, and **project methodologies** (**Waterfall and Agile**).
- Skilled in **Windows** and **Unix-based** operating systems.
- Optimisation algorithms (Particle Swarm Optimisation, Genetic Algorithm, Gradient Descent)
- Experienced in the use of **Docker**, **GitHub**, **Linux**, **high performance computer clusters**.

Practical Techniques:

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

Other Experience and Extra-curricular activities

Camp Counselor - American Youth Foundation Jun – Sep 2019

Responsible for organising events for large groups of all ages while simultaneously managing a cabin full of kids; planning and coordinating with other staff members a varying schedule that required forethought as well as the flexibility to react and adapt to situations that arose.

Research Assistant Placement at Edinburgh Royal Observatory Nov – Dec 2017

Supporting the stakeholder engagement coordinator in the Space and Satellite innovation programme at Edinburgh Royal Observatory; selecting and writing concise accessible reports on topics of interest in astronomy (e.g. the potential of Lagrangian Points for stationing satellites).

Men's Captain - Glasgow University Ultimate Team April 2020 – April 2021

- Managed a competitive team and played a primary leadership role in running a 100+ person University Sports Club.
- Led the team through novel challenges posed by the pandemic through forward-thinking, planning, and development of intake forecasts and risk assessments.

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.
- Involved online research and utilising various resources such as online forums (e.g. StackOverflow for Python) for problem-solving, experimentation and learning.
- Employed practical skills including soldering and working with circuits and metal/woodwork.

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