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**, for my master's project, building and implementing **agent-based models** in **Python** to study economic systems through physics concepts.

Research Experience

Masters Project: Econophysics: Agent-based modelling of markets from kinetic theory of gases and Brownian motion Sep 2022 - Present

Supervisor: Prof. David Ireland (School of Physics Head)

- **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 Sep 2021 - Aug 2022

Supervisor: Dr David A. Duncan

- Studying 2D materials including Graphene, and graphene-like films in **ultra-high vacuum** (UHV) at the **Diamond Light Source synchrotron**.
- Utilised **chemical surface analysis techniques** including **X-ray and electron diffraction and spectroscopy, and microscopy.**
- Carried out varied **data analysis** for respective 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-hosted **SCARF high performance computing cluster.**
- Balanced workload of group and independent projects.
- Carried out research in collaboration with/on behalf of groups in other international universities including the Technical University of Munich**.**
- Involved in numerous **customer-facing tours** of the facility and **mentorship programme** for supporting newer employees during their first 3 months working at the company.
- 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),* ***3 more due to be published this year.***

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, Waves & Diffraction, Solid State Physics, Physical Chemistry, Inorganic Chemistry, Organic 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:	Mathematics (A), Physics (A), Chemistry (A), Computer Science (A), Biology (A), Geography (A), French (A), English (A)

Technical Skills

My physics labs have been based around developing general experimental problem-solving:

- Applying **critical thinking and problem solving** to understand, design, and execute in-depth physics-based experiments, within a short time frame and with limited preparatory knowledge (e.g. Laser Interferometry, Polarisation, Nuclear and Electron Spin Resonance).

Developing programming proficiencies:

- **Python, FORTRAN** and **MATLAB** for various **data analysis**.
- Additionally, **LiveCode**, **SQL**, **HTML** and **CSS**, and **project methodologies** (**Waterfall and Agile**).
- Skilled in **Windows** and **Unix-based** operating systems.
- 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)
- **X-ray and Electron Diffraction** based techniques (XSW, LEED, ARPES, PhD)
- Scanning Tunneling Microscopy
- **Ultra-high vacuum** systems
- Standard Chemical Techniques.

Other Experience and Extra-curricular activities

Summer 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.

Fundraising - JGHS South Africa Trust Oct 2017 - Feb 2018

Fundraising for a trust set up for partner school in South Africa; Played a primary role in organising fundraising events; enrolling volunteers, contributors and attracting sponsors (e.g. Santander Bank).

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.
- Demonstrated leadership skills in taking initiative, establishing effective division of labour, and utilising the abilities and enthusiasm of committee members.

Home Projects April - Sep 2020

- **Self-directed** and **curiosity-driven** study during interruption of formal education.
- Completed challenging projects such as reverse-engineering hardware (modifying Raspberry Pi, repurposing IR receiver from an old TV and repairing various technology), electroplating and heat treatment in making jewellery and 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), Spoken Mandarin (Intermediate Level), French (National 5)