DR ADAM S WYATT
Computational & Experimental Scientist

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SUMMARY

Python | Matlab | C/C++ | Javascript | LabVIEW | PyQt/Pyside 6 | MySQL | PHP | Graphical User Interfaces | Data Analysis | Data Visualisation | Modelling & Simulation | Hardware Control | Git/GitHub | SVN | Project management | Team management

Extensive knowledge & experience in numerical/scientific computing, modelling and simulation, data acquisition and hardware automation, data analysis workflows, data processing, graphical user interfaces and data visualisation. Extensive hands-on experimental experience in laser and optics, experimental design, modelling and implementation, equipment calibration, measurement and interpretation.

PROFESSIONAL EXPERIENCE

Oct 2023 – June 2025   **LEAD OPTICAL PHYSICIST/ENGINEER**

LumOptica Ltd, Station Road Workshops, Station Road, Bristol, BS15 4PJ

A small laser & optics R&D consultancy providing technical solutions from conception through to design, prototyping and testing to the UK MOD and large technology companies as well as running in-house innovation project. My day-to-day activities include:

- Reporting directly to the CEO, taking the lead in planning and running R&D projects, managing resources and time-keeping, adapting project scope to fit constraints, presenting project results to stakeholders (both technical and non-technical audiences).
- Lead and mentor a team of optical research engineers, performing peer reviews, providing critical feedback, maintaining standards.
- Field technical enquiries, assess their feasibility and propose statements of work in response.
- Development of new opportunities: interpret requirements, devise approaches to address them, assess likelihood of success and identify partners/sub-contractors, etc., innovate new ideas and submit funding bids.
- Introduction and management of **Git workflows**.
- **Programming using python** and pyside (PyQt) for hardware control, data analysis, data visualization, **graphical user interfaces**.
- Support the development of our Quality Management System and aid company continual improvement, developing & writing standard operating procedures and policies, technical documentation, health and safety, recruitment.
- Undertaking optical design, simulation, physics modelling, hardware control and data analysis with full documentation.

Jul 2023 – Dec 2024   **VISITING SCIENTIST**

Blackett Laboratory, Department of Physics, Imperial College, London, SW7 2AZ

Part of the quantum optics and laser science (QOLS) group studying strong-field laser-matter interactions and XUV spectroscopy: studying how the band-structure and correlated electron dynamics affected the XUV emission during high harmonic generation from solids. Developing **numerical modelling** of the underlying physics, corroborating with measured data, **advanced data analysis** and publication-ready visualisations.

Aug 2013 – Oct 2023   **SENIOR EXPERIMENTAL AND COMPUTATIONAL SCIENTIST: XUV IMAGING AND SPECTROSCOPY / LINK SCIENTIST**

Central Laser Facility, STFC Rutherford Appleton Laboratory, Harwell Campus, Didcot, OX11 0QX

- Beamline link scientist: liaising with academic users, preparation and operation of beamline for user experiments, health & safety management and risk-assessments, technical assessment of proposals, help in preparation of proposals.
- Primary responsibility for **scientific compute capability**, digital infrastructure, hardware control & automation and data acquisition systems within group. Writing **graphical user interfaces** for external users to control complex hardware with automated data collection, storage, online analysis and visualisation.
- 4x work package manager (including **digital infrastructure**): budget management, planning, determining project scope, timeline and team & resource management.
- Member of various working groups: ptychography, Artemis/Ultra facility upgrade, High power laser contrast, adaptive optics.
- Additional roles: laser responsible officer, **CLF computing board**, **scientific computing tech lead** (introduction & management of **Git/GitHub**, integration of DAaaS - data analysis as a service), facility access panel, recruitment panel, student supervision.

Aug 2013 – Sep 2018   **VISITING SCIENTIST**

Clarendon Laboratory, University of Oxford, Parks Road, Oxford, OX1 3PU

- Coherent diffraction imaging and high harmonic generation experiments as part of an EPSRC project grant (EP/L015137/1).
- Co-supervision of PhD students.
- Development of ultrafast characterisation schemes.
- Providing software and training: numerical simulations for nonlinear propagation, optical parametric amplification, and high harmonic generation; interfacing and controlling hardware (spectrometer, cameras, shapers, motion control, automatic alignment).

Jan 2008 – Jul 2013   **POST-DOCTORAL RESEARCH ASSOCIATE**

Clarendon Laboratory, University of Oxford, Parks Road, Oxford, OX1 3PU

Lead researcher in the development of novel methods for the generation, complete space-time characterisation and control of intense few-cycle near-infrared/visible femto- to sub-femtosecond ultraviolet and attosecond extreme ultraviolet pulses for time-resolved spectroscopy and dynamical imaging.

EDUCATION

DPHIL | Atomic and Laser Physics | University of Oxford   2003 – 2007
MPHYS (1ST CLASS) | Physics | Imperial College, London   1999 – 2003

KEY SKILLS AND EXPERIENCE

- Developing graphical user interfaces in python using PyQt (Pyside6) and pyqtgraph:
  - Using hierarchical object-orientated programming (OOP) based model-view-controller (MVC) architecture based on signal/slot messaging system for scalable & modular GUIs, multithreading via QRunnable/QThreads.
  - Interfacing with various hardware from variable manufacturers (spectrometers, CCD/CMOS sensors, photodiodes, motorised stages, sensors).
  - Providing flexible options for user-adjustable parameter scans.
  - Providing real-time analysis and visualisation.
  - Integration of feedback control and optimization: global (genetic algorithms, simulated annealing, stochastic tunnelling, differential evolution, particle swarm) and local (downhill simplex, Newton, gradient descent, linear & nonlinear least squares).
  - Processing large data sets (>100GB), data stores, image analysis, model fitting & refining.
- Modelling and numerical simulations of complex linear and nonlinear optical systems:
  - Near-field and far-field free space optical propagation of continuous wave lasers and ultrabroadband pulses.
  - Modal decomposition and coupling calculations in optical waveguides/fibres.
  - Nonlinear propagation of ultrashort laser pulses, e.g. soliton dynamics, spectral broadening and pulse compression.
  - Ray tracing optical components (compound lens/mirror systems, grating/prism stretcher/compressors etc).
  - Strong-field atomic and molecular dynamics (e.g. high harmonic generation).
  - Fitting physical parameters to experimental data from complex optical setups.
- AI/machine learning: neural networks, NEAT, LSTM, Gaussian processes, classification.
- Git and SVN workflows (team management, branching, merge, pull request, code reviews).
- Design, implementation, and operation of complex optical setups (free space, waveguides, UHV beamlines, XUV/SXR spectrometer, imaging systems, interferometers, diagnostics, nonlinear optics, pulse shaping, adaptive optics, high harmonic generation, photoelectron spectroscopy, FTSI, pulse compression).
- Operation and maintenance of scientific laser systems.
- Interferometry & holography, coherent diffraction imaging & ptychography.
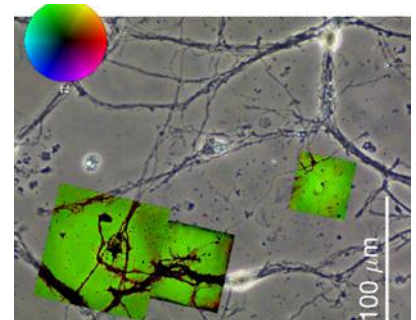- Ray tracing (python/Zemax), physical and Fourier optics, waveguides.

Figure 1 : Images of neuron sample, using phase contrast imaging and XUV ptychography.
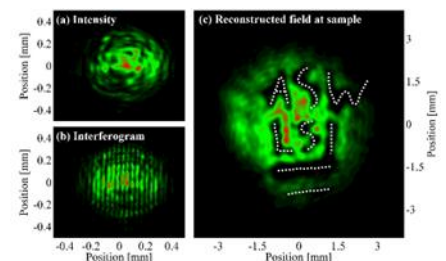

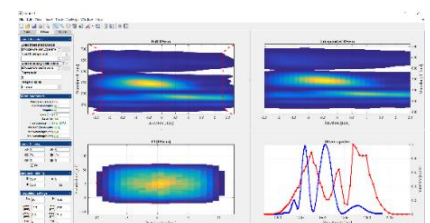*Figure 2: Reconstruction of writing etched on glass slide via "lateral shearing interferometry" (LSI).*

Figure 3: GUI for data visualisation and analysis.