James David Pickering

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Experienced scientist at the interface of physics and chemistry. Strong track record of delivering high-quality results in complex scientific projects. Technical expertise in spectroscopy, optical and laser physics, scientific computation, data science, and scientific instrument design and construction (optical, mechanical, electronic, and control software). Award-winning scientific educator, writer, and communicator.

Career History

Lecturer (Assistant Professor) — **University of Leicester, UK**
Dec 2021 - Present

Key Responsibilities:
- Running research projects on optics, imaging, spectroscopy, and data science.
- Deputy Director of Education. Developing curricula and managing ∼30 teaching staff across campuses in the UK and China.
- University laser safety officer. Developing and managing laser laboratory spaces across the university.

Key Achievements:
- Won ∼£100k in competitive funding for research projects in spectroscopy, optics, imaging, and scientific computation. Developed active national and international collaborations across multiple disciplines.
- Built and managed the first ultrafast laser facility in the University of Leicester. Developed a number of instruments and software tools for this space, including novel low-cost laser beam profilers and Bayesian data analysis tools.
- Developed extensive novel undergraduate courses and curricula, especially within programming, data science, instrument development, and mathematics. Leading a team that has reimagined our undergraduate degree courses to align more closely with employer and industrial expectations.
- Winner of 'Best Lecturer' award for 4 years consecutively and twice nominated for 'superstar' teaching award.
- Working on a number of university-wide EDI initiatives. PI on pilot project awarded £60k from the Royal Society of Chemistry for providing routes for under-represented groups into STEM study. Twice winner of university 'Citizen's Award' for this work.

Postdoctoral Researcher — **Aarhus University, Denmark**
Oct 2020 - Oct 2021

Key Responsibilities:
- Running a program of experimental research in nonlinear spectroscopy of interfaces.
- Helping to manage a large laser laboratory space, and supervising research students.

Key Achievements:
- Wrote a series of tutorial articles on SFG spectroscopy theory, instrumentation, and data analysis, including a bespoke piece of analysis software. These articles won a 'Scilight' award from the American Institute of Physics.
- Designed and built a novel and low-cost liquid surface height controller, published in Review of Scientific Instruments.
- Designed, built, and maintained a number of optical systems for nonlinear spectroscopy, including instruments for nonlinear light scattering and ultrashort pulse manipulation.

Postdoctoral Researcher — **University of Oxford, UK**
Oct 2019 - Oct 2020

Key Responsibilities:
- Setting up a new laboratory space for studies of ultrafast molecular dynamics.
- Design and construction of a novel instrument for imaging mass spectrometry.

Key Achievements:
- Designed and built the first multi-user ultrafast laser spectroscopy beamline in the Oxford Chemistry department.
- Designed and built an imaging mass spectrometer. Undertook all aspects of the process, including CAD design, charged-particle beam simulation, and mechanical and electrical assembly. Effectively worked with building management, various suppliers, and electrical and mechanical workshops to develop and build this lab space and instrument to the specification required.

Stipendiary Lecturer — **University of Oxford, UK**
Oct 2019 - Oct 2020

Key Responsibilities:
- Teaching undergraduate courses in physical chemistry and mathematics to ∼50 students in small-group tutorials.
- Running admissions interviews for undergraduate chemists at Merton College Oxford.

Key Achievements:
- Consistently received exceptional feedback from students and senior staff. Students petitioned the university to keep me employed when my contract ended and I moved positions to Aarhus.
- Developed a graduate-level course on experimental optical and and ultrafast laser physics. This course formed the basis of my first book, published by the Institute of Physics in 2021 (second edition 2024).

Teaching Fellow — **University of Leicester, UK**
Jan 2019 - May 2019

Key Responsibilities:
- Teaching a variety of undergraduate chemistry courses, supervising students in experimental lab work.

Key Achievements:
- Joint winner of 'Best Lecturer' award despite teaching for less than half of the academic year.

Postdoctoral Researcher — **Aarhus University, Denmark**
Sept 2018 - Dec 2018

Key Responsibilities:
– Finalising and submitting manuscripts from PhD study.

Key Achievements:
– Pioneering work on ultracold molecular complexes from my PhD study resulted in a number of articles published in leading physics and chemistry journals. These continue to be highly cited in the field.

Technical and Transferable Skills

– Scientific instrument design and development, especially within:
  - Optics and photonics, especially ultrafast and high-intensity laser optics.
  - Light-matter interaction, especially optical and laser spectroscopy.
  - Ultra-high vacuum systems, cryogenics, and flow control systems for gases and liquids.
  - Imaging and detection systems (charged particle and optical).

  I am experienced in working closely with electrical and mechanical engineers to develop and realise designs, and have a good working knowledge of data acquisition and instrument control electronics and software. Instruments designed and built by wholly or partly by me are currently in use in multiple active research labs across the UK and in Europe.
– Design of advanced data analysis software and modelling tools for a range of applications across the physical and life sciences, including for complex nonlinear and multidimensional problems.
– Software development for instrument control, data acquisition, and advanced data analysis.
– Effective written and spoken communication across diverse fields, allowing me to collaborate productively with researchers in a wide range of fields (including medical biology, atmospheric chemistry, and particle physics).

Programming Languages: Python, Fortran, TEX (advanced), MATLAB, Rust, C++, Lua, Shell Scripting (competent).

Software Packages: Autodesk Inventor, SolidWorks, Zemax OpticStudio, SIMION

Education

Aarhus University — **Aarhus, Denmark**
PhD Chemical Physics, Supervisor: Prof. Henrik Stapelfeldt. — *2015 - 2018*
Thesis: *Alignment and Imaging of Molecular Complexes Embedded in Helium Nanodroplets.* Funded by a Marie Curie Horizon 2020 project. Presented work at a number of national and international conferences.

Jesus College, University of Oxford — **Oxford, UK**
MChem Chemistry, First Class Honours, Ferdinand Prize — *2011 - 2015*
Master's project developing a novel piece of data analysis software, which has been highly cited and is still actively used.

Braintree Sixth Form — **Braintree, UK**
International Baccalaureate Diploma, 40 points. — *2009 - 2011*

Languages

English: Fluent (Native Language)

Danish: Highly Proficient (B2)

Mandarin Chinese, French, German: Elementary (A1)

Selected Funding and Awards

Research Grants — **Royal Society**
£20,000 awarded to construct novel optical instruments for studying ultrafast dynamics of proteins. — *2024-2025*

Research Fund — **Royal Society of Chemistry**
£5000 awarded to construct a NOPA light source for ultrafast optical spectroscopy. — *2024-2025*

Collaborations Grant Scheme — **Royal Society of Chemistry**
£3020 awarded for design of novel sample cells for ultrafast optical spectroscopy. — *2024-2025*

Missing Elements Grant Scheme — **Royal Society of Chemistry**
£60,000 awarded for EDI project to address the 'leaky pipeline' in chemistry. — *2023-2026*

Future 50 PhD Scholarship — **University of Leicester**
Awarded PhD student as primary supervisor, working on haem protein dynamics. — *2023-2027*

Selected Awards and Qualifications

University of Leicester
2× Citizen's Award for excellence in management and administration. *2023, 2024*

University of Leicester
6× Best Lecturer Award (awarded annually in both UK and China campus). *2022-2025*

Selected Publications

Books and Book Chapters

Ultrafast Lasers and Optics for Experimentalists
J. D. Pickering, IOP Publishing. *2021, 2024*
First Edition: May 2021. Second Edition: Dec 2024.

Molecules in Superfluid Helium Nanodroplets: Spectroscopy, Structure, and Dynamics
Book chapter in the above. J. H. Nielsen et al, including J. D. Pickering. Springer. *2022*

Journal Papers - *h*-index: 11

16 articles (8 first author), >400 citations.
See Google Scholar (link) for full details. Selected works include:
– **AIP Scilight Awarded:** Tutorials in vibrational sum frequency generation spectroscopy. I. The foundations (J. D. Pickering *et al*, Biointerphases 17, 2022).
– **Editor's Pick:** Femtosecond laser induced Coulomb explosion imaging of aligned OCS oligomers inside helium nanodroplets (J. D. Pickering *et al*, J Chem Phys 149, 2018).
– **Novel Instrument Developed:** A liquid surface height controller for surface spectroscopy (J. D. Pickering *et al*, Rev Sci Inst, 92, 094104 2021).

Miscellaneous

Nationality: British Citizen.

Misc Skills: Full UK Driving Licence.

Other Interests: Long-distance road cycling, guitar player, vintage guitar amplifier design and construction, Go player.