JOSEPH ALLCOCK

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I am a researcher at a leading nuclear fusion lab, with expertise in optics, plasma physics and computer programming.

EXPERIENCE

Postdoctoral researcher
📍 **UK Atomic Energy Authority, Oxfordshire, UK**
📅 2020 – present

- Leading on design and operation of scientific cameras on MAST-U, the UK's flagship fusion experiment.
- Data analysis to understand how plasma behaves inside fusion reactors, helping meet programme milestones.
- Writing software, using techniques from computer vision, ray-tracing, tomography and Bayesian statistics.
- Supervised a successful student research project, receiving excellent feedback.
- Fellowship joint-funded by Princeton Plasma Physics Lab.

PhD researcher
📍 **Various**
📅 2015 – 2020

- Completed graduate courses in fluid dynamics, C++ and high-performance computing.
- Research focus: a technique known as 'coherence imaging' for measuring plasma flow, temperature and density in 2-D.
- Research outcomes: improved performance using a novel sensor technology and reduced calibration hardware cost by a factor 10.
- Wrote polarisation ray-tracing software using Python that is now used by multiple research groups.
- Established collaborations for knowledge transfer, spending 8 months total at labs in Eindhoven (NL), San Diego (USA) and Chengdu (China).
- Presented results at international conferences, via talks, posters and proceedings.
- Voluntary roles included scientific outreach at schools and New Scientist Live and organising weekly talks for the graduate student community.

Intern
Kromek PLC, Durham, UK
📅 Summer 2014

- Helped develop a portable neutron-gamma radiation detector.
- Internship was funded by the Institute of Physics.

SELECTED PUBLICATIONS

- Allcock, J. S., et al. "2D measurements of plasma electron density using coherence imaging with a pixelated phase mask." *Review of Scientific Instruments* 92.7 (2021): 073506.
- Long, T., Allcock, J. S., et al. "Doppler coherence imaging of scrape-off-layer impurity flows in the HL-2A tokamak." *Review of Scientific Instruments* 91.8 (2020): 083504.
- Feng, X., et al. "Development of an 11-channel multi wavelength imaging diagnostic for divertor plasmas in MAST Upgrade." *Review of Scientific Instruments* 92.6 (2021): 063510.
- Allcock, J. S., et al. "Wavelength calibration of imaging birefringent interferometers using spectral lines" (submitted to Optics Express).

EDUCATION

PhD, Physics
📍 **Durham University, UK**
📅 2015 – 2020

- Member of the Centre for Advanced Instrumentation (CfAI) and the Fusion Centre for Doctoral Training (Fusion CDT).
- Thesis 'New techniques for coherence imaging fusion plasmas' was commended as excellent by examiners.
- 2017 University College Travel Scholarship recipient.

MPhys, Physics (1st)
📍 **University of York, UK**
📅 2011 – 2015

A-levels
📍 **Bacup & Rawtenstall Grammar School, UK**
📅 2009 – 2011

- A*AA in maths, physics, art + design.

SKILLS

- Programming (years experience):

  `Python (8)` `Matlab (2)` `Mathematica (2)` `C++ (1)` `JavaScript (<1)` `Fortran (<1)` `IDL (<1)`

- Computing:

  `Latex` `Git` `Linux/Unix` `MacOS` `Adobe`

- Scientific:

  `optics` `statistics` `computer vision` `data analysis` `fluids` `plasma` `spectroscopy` `inverse problems`

- General:

  `communication` `collaboration` `student supervision` `public speaking`

- Creative:

  `fine art` `data visualisation`