

John Adams Institute

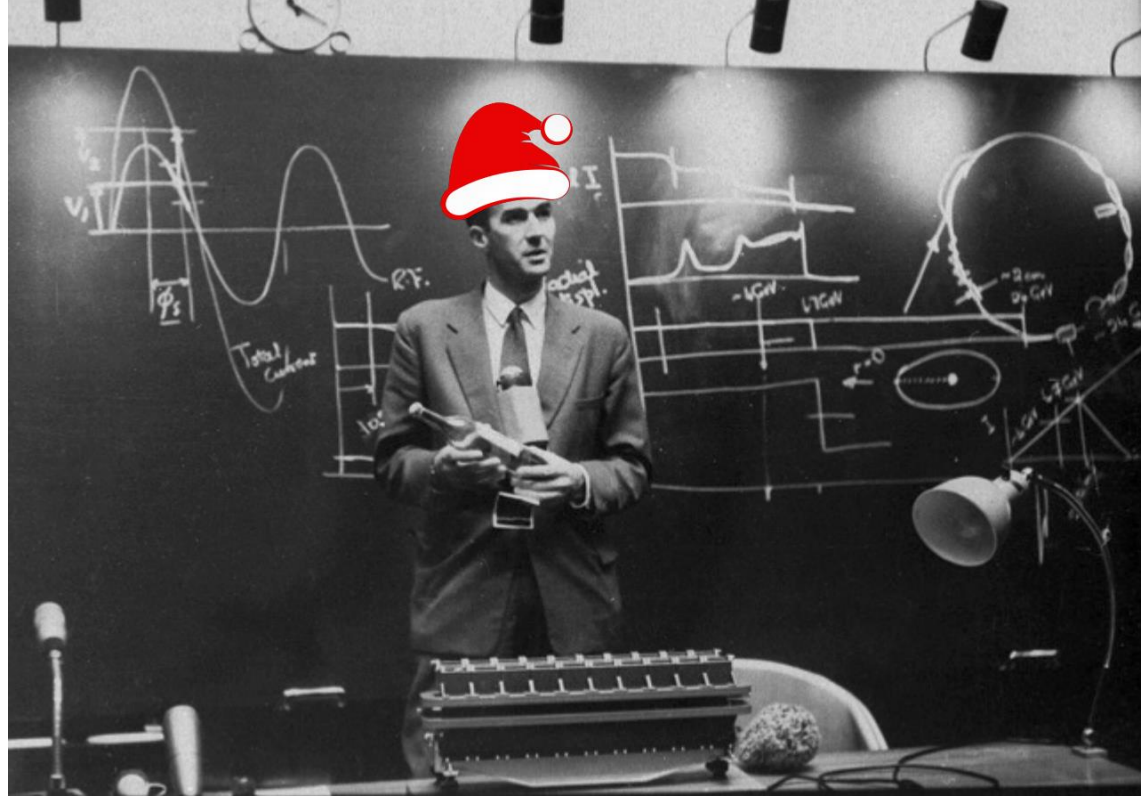
Philip Burrows, Director



JAI Fest, RHUL
Dec 19 2024

Welcome!

- JAI Fest 2025
- Annual JAI family meeting
- Brief news / updates
- R&D highlights from students and postdocs



Outline

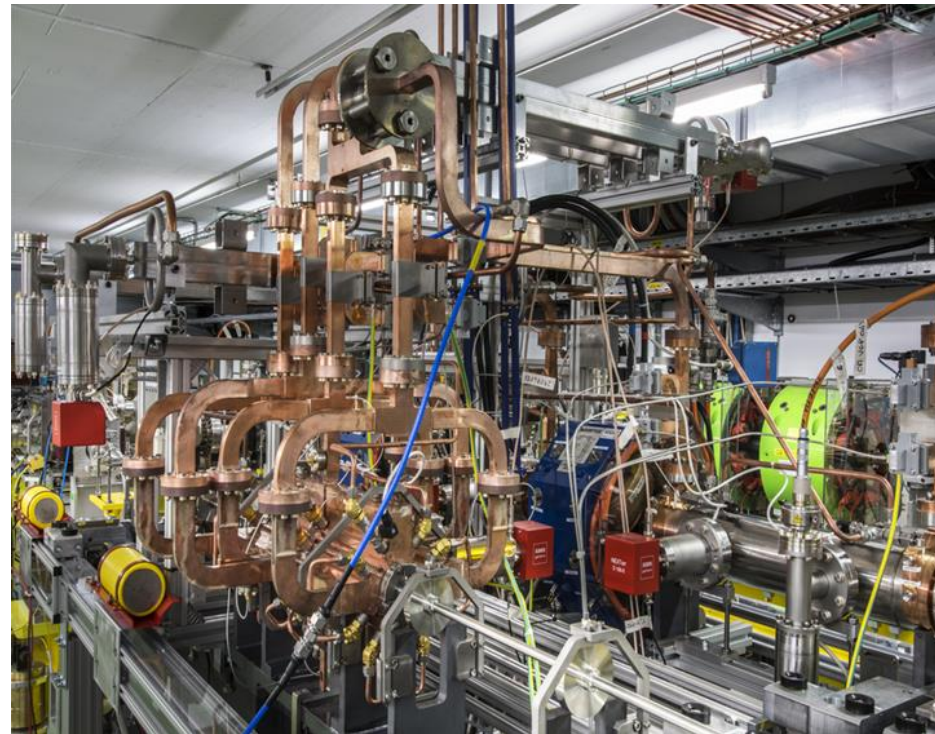
- **JAI mission + overview**
- **Strategy**
- **Funding**
- **News**
- **Programme covered by the following speakers!**

JAI Mission

A centre of excellence for advanced and novel accelerator technology:

provide expertise, research, development and training in accelerator techniques, and

promote advanced accelerator applications in science and society



JAI Overview

One of two UK national academic centres of excellence in accelerator science & technology, set up in 2004

Oxford University, Royal Holloway, Imperial College

- **Research & development**
- **Education & training**
- **Knowledge exchange, impact, public engagement**

109 members:

- **20 faculty**
- **36 staff**
- **53 PhD students**

+ 46 affiliates (STFC labs, CERN ...)

JAI Research Strategy

- **World-class R&D at the cutting edge of accelerator science and technology**
In collaboration with our UK and international partners
- **Lead and support UK's strategic accelerator interests**
Domestic and overseas accelerator facilities/programmes
- **Capitalise on our strengths to make an impact**
- **Train next generation of accelerator scientists + engineers**
Provide outstanding R&D opportunities on forefront projects

Proactive and nimble in securing resources to support these ambitions

→ see later

JAI Advisory Board



- Deepa Angal-Kalinin (ASTeC)
- Bill Barletta (ex-LBNL, MIT/UCLA)
- Oliver Bruning (CERN)
- Jonathan Dorfan (SLAC)
- Eckhard Elsen, Chair (ex-CERN, DESY)
- Christoph Quitmann (ex-MAXIV, Research Instruments)
- Akira Yamamoto (KEK, CERN)

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JAI Advisory Board

from 2026



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- Mei Bai (SLAC)
- Mike Lamont (CERN)
- Ritchie Patterson (Cornell)
- Eckhard Elsen, Chair (ex-CERN, DESY)
- Christoph Quitmann (ex-MAXIV, Research Instruments)
- Akira Yamamoto (KEK, CERN)

Mei Bai (SLAC)

- Distinguished Scientist
- Deputy Director for Science,
Accelerator Directorate



Ritchie Patterson (Cornell)

- Helen T. Edwards
Professor of Physics
- Director,
Center for Bright Beams



Mike Lamont (CERN)

- Director,
Accelerator and Technology



Some highlights 2022-24

- Published 320 journal articles and conference papers
- Secured additional income of £26M on top of our STFC core grant of £7M
- 35 students graduated with PhDs; all employed, includes:
 - 9 CERN Fellows/Staff
 - 8 industry (5 to start-ups)
 - 1 teaching
- D'Arcy + Oeftiger appointed Assoc. Professors @ Oxford
- Martin appointed Visiting Professor @ Oxford
- Public engagement activities reached a live audience of > 15,000



William Shields (RHUL)

Lecturer in Accelerator Physics

BDSIM

LhARA



Alex Gerbershagen (Oxford)

Associate Professor

*Head of Particle Therapy
Research Center at the
University Medical Center
Groningen in the Netherlands*

**Particle therapy accelerators,
diagnostics and isotope
production**



Key expertise (faculty + core staff)

Beam dynamics

Burrows, Martin, Oeftiger, Pasternak, Sheehy, Shields, Tsesmelis

Beam instrumentation, feedback & control

Bett, Boorman, Burrows, Gerbershagen, Gibson, Karataev, Reichold

RF systems

Bett, Foster, Lyapin, Zhang

Metrology & alignment systems

Reichold

Laser + plasma systems

D'Arcy, Foster, Hooker, Mangles, Najmudin, Norreys, Rose, Walczak

Medical beamlines

Dosanjh, Gerbershagen, Long, Pasternak, Sheehy, Shields

Accelerator R&D themes

Particle physics colliders and beamlines

Bett, Boorman, Burrows, Foster, Gibson, Karataev, Oeftiger, Reichold, Shields, Zhang

Light sources

Burrows, Karataev, Martin

Intense hadron beams

Boorman, Gibson, Long, Oeftiger, Pasternak, Sheehy

Advanced acceleration techniques

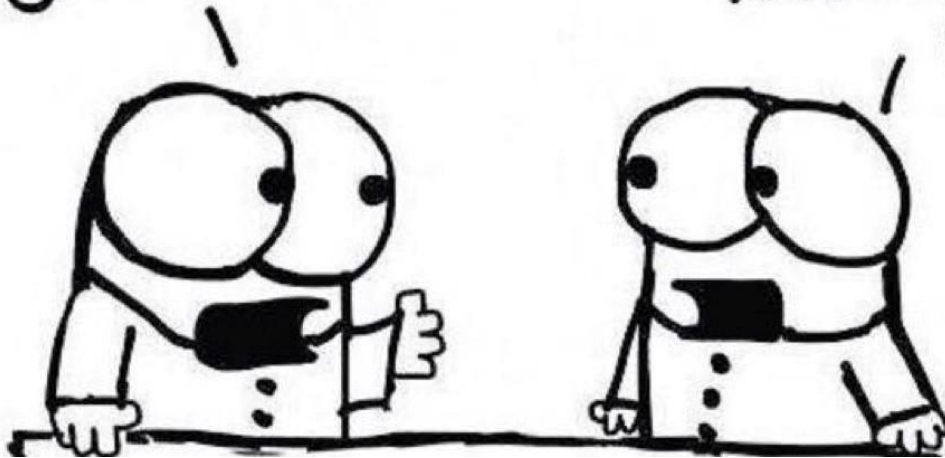
Burrows, D'Arcy, Foster, Hooker, Mangles, Norreys, Najmudin, Rose, Walczak

Societal applications

Dosanjh, Gerbershagen, Long, Najmudin, Pasternak, Reichold, Sheehy, Shields

I ASKED
SANTA
FOR A
RESEARCH
GRANT.

YOU STILL
BELIEVE IN
RESEARCH
GRANTS?



© THE
UPTURNED
TELESCOPE

Funding 2025-28



- STFC core grant April 2025 – Sept 2028 (42 months): **£6.6M**
- University contribution: **+ £2M**
- Additional grants, awards and facilities access:

Awards from STFC studentships, CERN Doctoral Studentships, Diamond, EPSRC already in hand

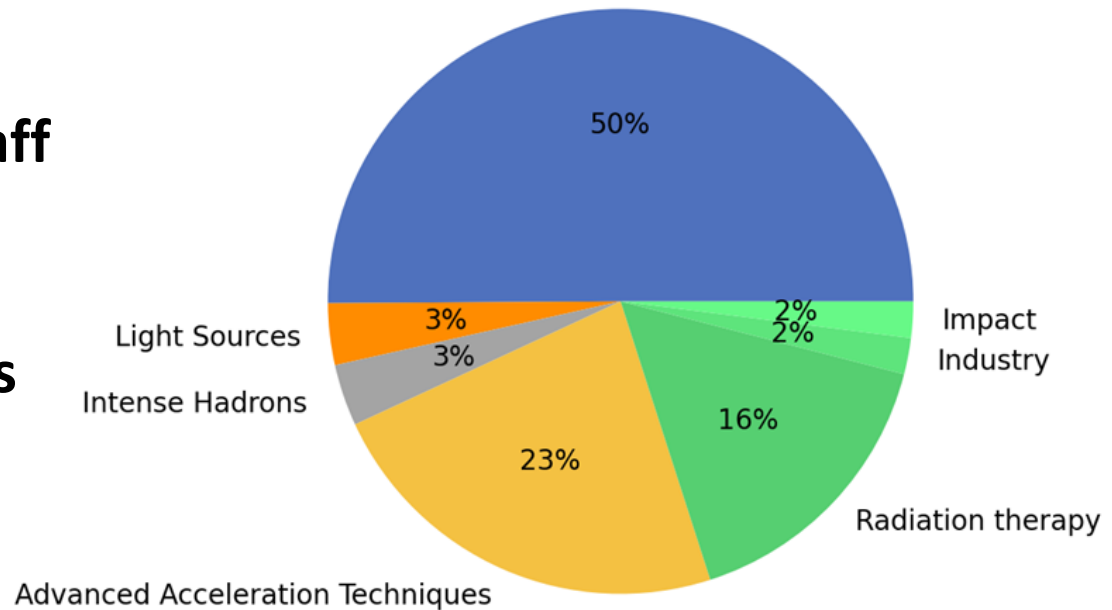
3 STFC 'quota' PhD studentships / year

Applications pending to: European Commission, EPSRC ...

New core grant from 1/4/25

- 95% on research staff
- ~500 staff months / 25 staff
- ~ zero capital
- £200k travel/consumables
- Academic time funded
@ 4% (18 investigators)

Particle physics (incl. AWAKE and HALHF)



Strategic partnerships

- **STFC national laboratories:**

 - Diamond Light Source**

 - ISIS**

 - Central Laser Facility + Extreme Photonics Applications Centre**

 - ASTeC, Daresbury Laboratory**

- **Cockcroft Institute**

- **CERN**

- **DESY**

- **KEK**

- **BNL, JLab, SLAC**

Diamond Light Source



Strong links with Accelerator Physics, Diagnostics + Controls

Martin + Bobb are JAI PhD graduates
joint support of students/PDRAs

PhD students (* = joint JAI/DLS):

Ji Li*	(2021)	(Oxford)
Dan Harryman	(2021)	(RHUL)
Niki Vitoratu*	(2020)	(RHUL)
Seb Wilkes*	(2021)	(Oxford)
Alec Clapp*	(2021)	(RHUL)
Corey Lehman*	(2023)	(Oxford)
Shaun Preston*	(2023)	(Oxford)



integrated optics design

CDR transverse position

e- energy measurements

timing mode for users

optical CDR BPM

beam loss monitors (AI/ML)

AI/ML tools / injection



Joint PDRA (Oxford):

Maxim Korostelev	2018-21
Riyasat Husain	2023-24
New appointment	2025-28

Diamond 2 lattice design

booster synchrotron upgrade

injection studies for Diamond 2



ISIS Neutron + Muon source



Strong links with Intense Beams, Accelerator Physics and Operations groups

Offer part-time PhD opportunity to ISIS staff (5 completed, 2 in progress)

PhD students (Oxford):

- Jake Flowerdew (2023) IBEX Paul trap
- Max Topp Mugglestone (2024) FFA beam dynamics
- Rob Williamson (2023) beam instabilities in the ISIS synchrotron
- David Posthuma de Boer (2018) beam coupling impedances on the ISIS synchrotron
- Carl Jolly (2023) beam dynamics / ISIS2 design
- Joshua Appleby (2024) transverse tune
- Francesco Straniero (2025) beam dynamics / collective effects



Joint PDRA (Oxford):

- Emi Yamakawa (2021) beam instrumentation
- Hannah Wakeling (2022) sustainability for ISIS2



Advisory Board comments (2025)

The AB is pleased to see that the contacts with the nearby facilities Diamond and ISIS continue to flourish...

Several interesting and essential R&D topics are being addressed by members of JAI to understand and remove remaining obstacles with a particular view on improving the operation of ISIS. Several essential R&D topics on the ISIS-II MW upgrade design options are worked on by JAI students...

These projects offer fantastic opportunities to students to work on national facilities to enhance the capabilities of these facilities.

The AB is pleased to see that JAI continues to address critical R&D areas in facility design, diagnostics and application of Machine Learning towards enhancing performance of the facility [Diamond].

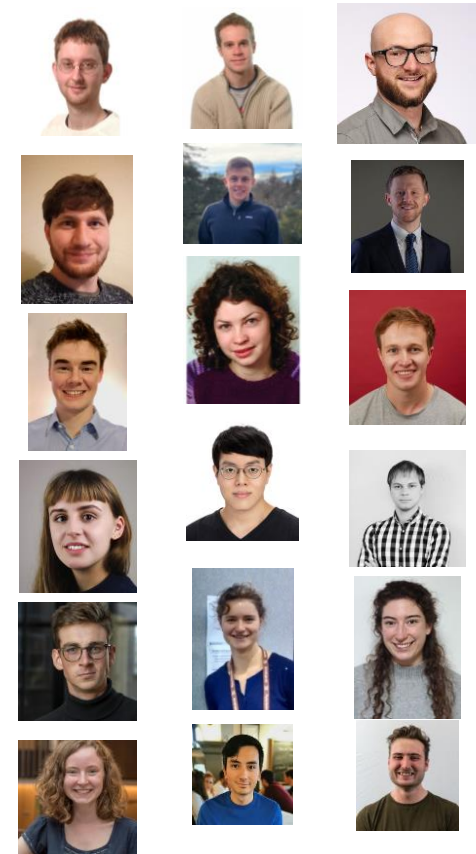
CLF

Strong links with Astra-Gemini and Vulcan laser facilities;
Major users of CLF facilities; contributed significantly to the design and specification of new EPAC (Hooker on EPAC project board, Mangles on ISTAC) and Vulcan20-20 facilities (Mangles on Science Case Update);

Co-funded PhD students

Aimee Ross	2021	Resonant excitation of plasma wakefields
Emily Archer	2020	Spatiotemporal optical injection
Sebastian Kalos	2022	Plasma-modulated plasma accelerators
Laurence Bradley	2023	X-rays from wakefield accelerators

+ > 30 other students have used CLF facilities



CLARA

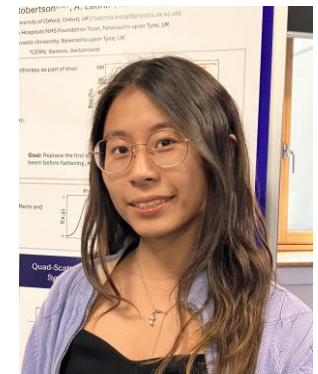


JAI sees CLARA as a key opportunity for the UK

- HALHF@CLARA
 - Staging demonstrator & high-average-power R&D
 - Collaboration between JAI (Oxford), CI, and Oslo
 - Large international (growing) team with 4 PhDs and 5 PDRAs
 - Major short-term impact for PP at CLARA
- VHEE
 - Collaboration with ASTeC and CI to develop VHEE FLASH concepts at CLARA
 - Sabrina Wang (PhD, Oxford) implementing double-scatter flat-beam generation in to CLARA sims (BDSIM, RF-Track)



‘Excellent news is that CLARA reached its full energy of 250 MeV at the beginning of April 2025 and will be a most valuable addition, for example, providing beams for research and in-vivo experiments that are not possible at CLEAR.’ [AB2025]



International

CERN

LHC, HL-LHC, AWAKE, FCCee, CLIC/ILC, CLEAR,
'Physics Beyond Colliders'

DESY

FLASHForward

KEK

Accelerator Test Facility (ATF), ILC Technology Network

BNL + JLab

Accelerator Test Facility, EIC

SLAC

FACET2

JAI / CERN doctoral students



2010:

Alex Gerbershagen

2012:

Davide Gamba

Jack Roberts

2015:

Swann Levasseur

2016:

Chetan Gohil

Pierre Korysko

Jan Paszkiewicz

2017:

Eugenio Senes

2018:

Gian Luigi D'Alessandro

Luke Dyks

2019:

Daniele Butti

Helene Guerin

Carlo Mussolini

2020:

Robert Murphy

Pablo Arutia Sota

Rebecca Taylor

2021:

Florian Stummer

2022:

Sasha Horney

Emily Howling

Vlad Musat

Jack Salvesen

2024:

Lewis Kennedy

Giusy Passarelli

23 Doctoral students

JAI CERN fellows/staff



2011:

Robert Apsimon

Ben Constance

2015:

Ewen Maclean (now staff)

2016:

Davide Gamba (now staff)

2017:

Neven Blaskovic

Alex Gerbershagen (staff)

2019:

Michele Bergemaschi

Swann Levasseur

Leon van Riesenhaupt

2020:

Jan Paszkiewicz

Eugenio Senes

2021:

Andrey Abramov

Rebecca Ramjiawan

2022:

Daniele Butti

Luke Dyks

Lawrence Wroe

2023:

Jake Flowerdew

Helen Guerin

Collette Pakuza

Pablo Arutia Sota (staff)

2024:

Max Topp Mugglestone

Laurence Nevay (staff)

Rebecca Taylor

2025:

Florian Stummer

21 fellows +3 staff in ATS
2 fellows now staff

Graduate destinations



- Since JAI foundation in 2004: > 120 PhD graduates (+ 53 in progress)
- Graduates secured positions at: CERN, DESY, EPFL, SLAC, FNAL, BNL, LBNL, STFC, universities

- CLF: Nicolas Bourgeois, Steven Dann, Kirill Fedorov, Benjamin Spiers, Christopher Thornton
- Diamond: Ian Martin, Lorraine Bobb, Neven Blaskovic
- ISIS: Ben Pine, Rob Williamson, Steven Brooks, Scott Laurie, *Ciprian Plostinar*
- DESY: Andreas Walker, Rob Shalloo, Emily Archer, John Dale, Tony Hartin, Jon Wood, Kristjan Poder
- MAX IV: Steve Molloy, Francis Cullinan, *Neven Blaskovic*
- ESS: *Neven Blaskovic*, Ciprian Plostinar
- PSI: Alex Gerbershagen
- SLAC: Christine Clarke, Glen White, Robbie Watt, Elias Gerstmayr, Savio Rozario
- Fermilab: Rob Ainsworth
- BNL: Christina Swinson
- LBNL: Tony Gonsalves, Alex Picksley

University faculty



 UCL HEP Group
<https://www.hep.ucl.ac.uk/~jolly/SimonJollyCV>

Prof. Simon Jolly – Curriculum Vitae

Leader of the UCL High Energy Physics Proton Beam Therapy group investigating novel detectors and diagnostics for quality assurance and imaging.

Charlotte Palmer

Dr 2011
Lecturer, [School of Mathematics and Physics](#)
Centre for Light-Matter Interaction (CLMI)



A/Prof 2010

Suzie Sheehy

Associate Professor in Medical Accelerator Physics
School of Physics

Dr Robert Apsimon  Lancaster University

Senior Lecturer in Electronic Engineering

Matthew Streeter

Dr 2013
Royal Society Univ Research Fellow, [School of Mathematics and Physics](#)
for Light-Matter Interaction (CLMI)
<https://orcid.org/0000-0001-9086-9831>



prof. A. (Alexander) Gerbershagen 2013



Head of Particle Therapy Research Center (PARTREC),
Team Leader for Accelerator and Radiation Physics

Email

William Shields

- [Centre for Particle Physics and Astronomy](#)
- Lecturer in Accelerator Physics, [Department of Physics](#)

Dr Christopher Arran  Lancaster University

Lecturer in Ultrafast Beams and Phenomena 2018



Group Leaders



Rob Williamson 2023

Accelerator Physicist Group Leader at ISIS, STFC

Ian P. S. Martin 2011

D. Phil. · Head of Department at Diamond Light Source

Lorraine Bobb
Head of Diagnostics, DLS

Stephen Molloy 2006

Head of Accelerator Operations at MAX IV Laboratory
Lund, Skåne län, Sverige · [Kontaktinformation](#)
703 följare · Fler än 500 kontakter

Rob Shalloo

Emmy Noether Group Leader | Plasma Accelerator Physicist
Hamburg, Hamburg, Tyskland · [Kontaktinformation](#)

Kristjan Pöder 2016

Lead of Plasma Accelerator Application development at
DESY

**prof. A. (Alexander)
Gerbershagen** 2013



Head of Particle Therapy Research Center (PARTREC),
Team Leader for Accelerator and Radiation Physics

Ciprian Plostinar
Head of Accelerator, ESS

Jonathan Wood 2016

Deutsches Elektronen-Synchrotron DESY: Hamburg, DE

2024-01 to present | Teamleader for beam-driven plasma acceleration (MPL)
Employment



UCL HEP Group
<https://www.hep.ucl.ac.uk> · ~jolly · SimonJollyCV

Prof. Simon Jolly – Curriculum Vitae

Leader of the UCL High Energy Physics Proton Beam Therapy group investigating novel detectors and diagnostics for quality assurance and imaging.



Class of 2024 visit to CERN (July 2025)

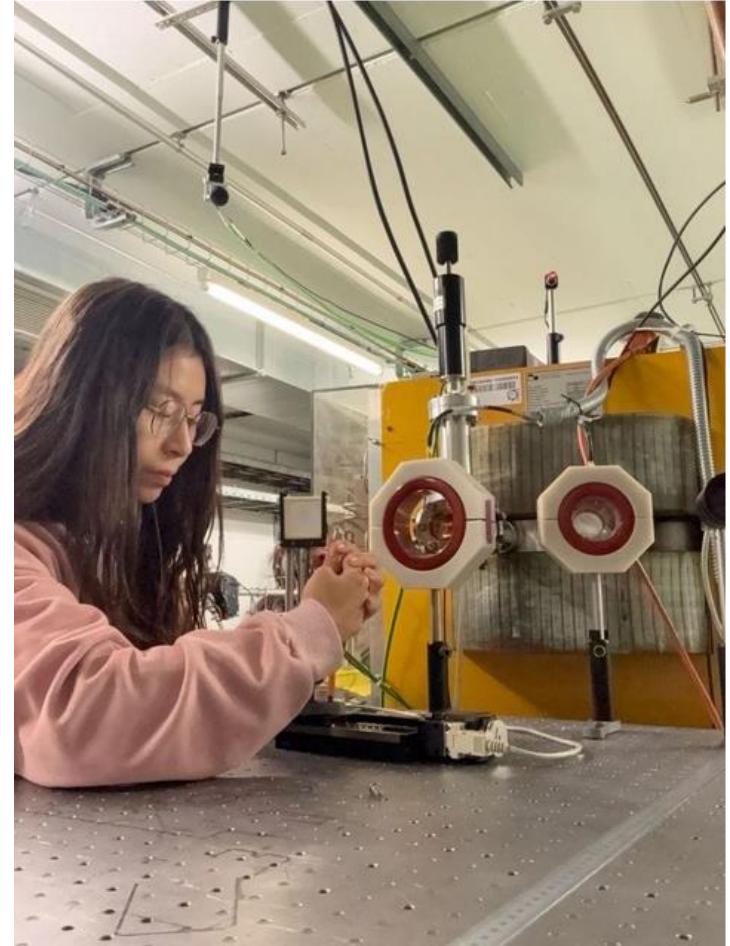


Congratulations!

Sabrina Wang

Awarded the John Adams Prize for outstanding performance in the first year

Now at CERN for her LTA working at the CLEAR Facility on Development of Scattering Systems for Tumour Conformality with VHEE Beams



Congratulations!

Alex Picksley

Awarded the 2025 Simon van der Meer Early Career Award in Novel Accelerators

'for pioneering contributions to high-energy laser-plasma accelerators suitable for future applications, including the development of metre-scale plasma channels, novel injection techniques, and single-stage generation of high-quality 10 GeV electron beams'



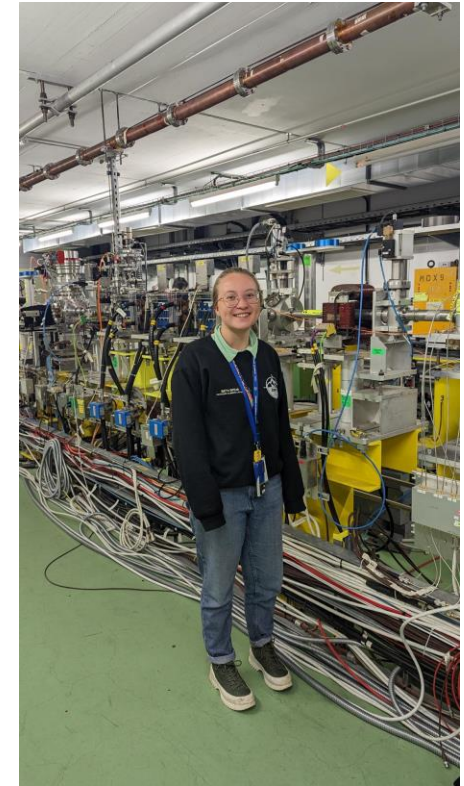
Congratulations!

Recent PhD graduates

Alec Clapp

Annabel Gunn

Bethany Spear



Congratulations!

Noa Steerenberg

Graduated in September with her Master of Science thesis on “Head-Tail Instability Study on the ISIS Neutron and Muon Source Rapid Cycling Synchrotron”, marked outstanding (6.0/6.0)



Congratulations!

Peter Norreys

2025 Institute of Physics / Société Française de Physique Fernand Holweck Medal and Prize

“For his outstanding contributions to fundamental studies of high energy density plasmas using high power and petawatt-class lasers, including fast ignition inertial fusion, particle beam acceleration and ultra-bright X-ray sources.”



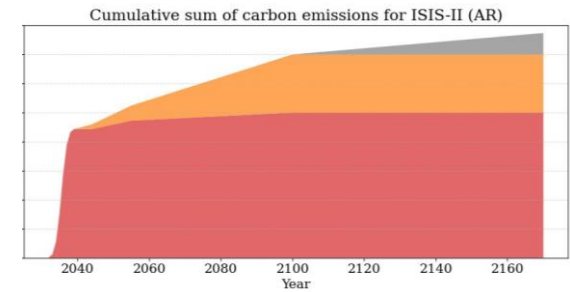
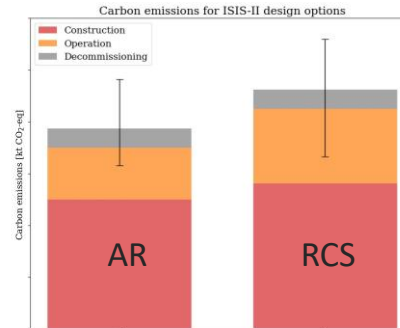
Congratulations!

- **Zixin Zhang**: *Nature Communications Physics* June 2025: “Computational modelling of the semiclassical quantum vacuum in 3D”.
Travel grant from the American Physical Society to present the research at the Division of Plasma Physics meeting Long Beach, California November 2025.
- **Sunny Howard**: *Nature Photonics* June 2025: “Single-shot spatiotemporal vector field measurements of petawatt laser pulses”
- **Robin Timmis** has submitted a letter to *Nature* October 2025: “Relativistic harmonics in the efficiency limit”.
- **Eduard Atonga** has submitted an article to *Physical Review Letters*: “Search for black-hole super-radiance using gravito-optic heterodyne detection”

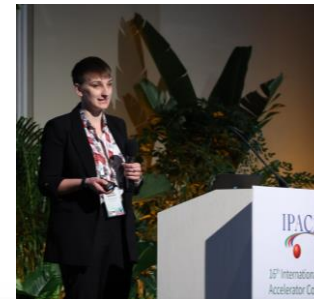
Environmental Sustainability

Hannah Wakeling

- ISIS-II Neutron and Muon Source
 - Life Cycle Assessment
 - Sustainability Strategy
 - Impact reduction studies



- High-level Environmental Sustainability Guidelines for Large Accelerator Facilities
 - Living document
 - Contributed talk at IPAC 2025
 - Nature Reviews Physics Comment



Comment

<https://doi.org/10.1038/s42254-025-00878-6>

Community-specific guidance for environmental sustainability in particle accelerators

nature reviews
physics

November 2025



Hannah Wakeling, Philip Burrows, Jim Clarke, Jo Colwell, Ben Shepherd & John Thomason

Check for updates

Congratulations!

Manjit Dosanjh



SAPPHIRE project <https://project-sapphire.org> was funded under the [Africa-UK Physics Partnership \(AUPP\) Programme](#) lead by Manjit in collaboration with Cambridge (Raj Jena) and Lancaster (Graeme Burt) with Ghana and Steve Biko Hospital, Pretoria

£ 492,000 Feb 2025 - Feb 2027

New EPSRC grant



Nov 2024 submitted an outline proposal to EPSRC call:
Healthcare Technology Translation Partnership Scheme

JAI/Oxford Physics and Oxford Oncology Department:

Kristoffer Petersson	Project lead	University of Oxford
Boris Vojnovic	Specialist	University of Oxford
Catriona Gilmour-Hamilton	Professional enabling staff	University of Oxford
Geoff Higgins	Project co-lead (UK)	University of Oxford
Iain Tullis	Research and innovation associate	University of Oxford
Linda Naughton	Grant manager	University of Oxford
Manjit Dosanjh	Project co-lead (UK)	University of Oxford
Philip Burrows	Project co-lead (UK)	University of Oxford
Jonathan Lane	Researcher co-lead	Oxford University Hospitals NHS Foundation Trust
David Rowlands	Specialist	Teledyne e2v (UK) Ltd

‘Linear accelerator for Mega Voltage Photon FLASH radiotherapy’

Grant has been awarded: £2M

(One of 12 of 221 submissions)

PaMlr prototype complete **Armin Reichold**

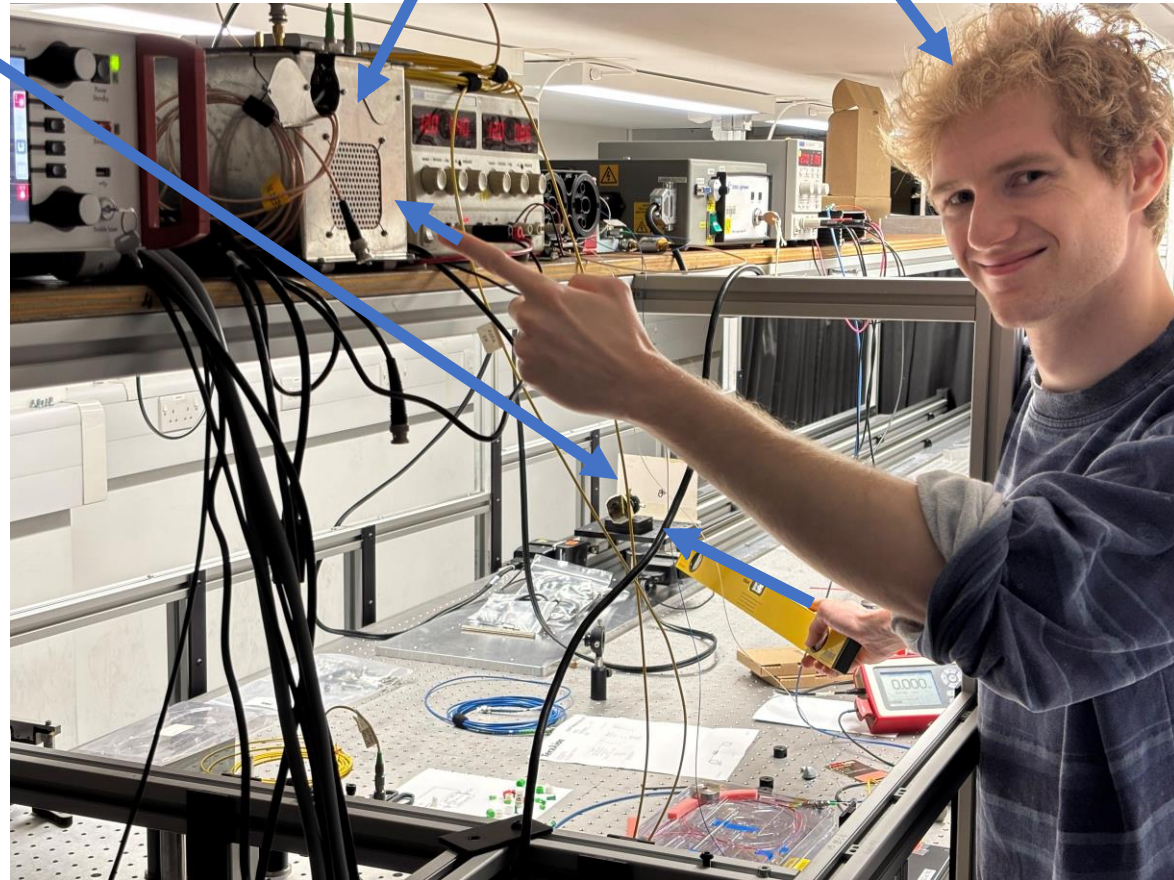
(Phase Modulation Interferometry)

Fast 1 m/s motion stage with OPD up to 9m

4-channel PAMlr prototype #2

Cal Hewitt, graduate student and future Schmidt AI fellow

- PaMlr hardware licenses signed by Hexagon
- Firmware & Software licenses to follow in January
- PaMlr prototype #1 now working at Hexagon from 0.2 to 20m up to 1 m/s
- Laser-tracer head developed by Hexagon working with PaMlr interferometer
- 12-channel μ TCA licenses due in January too



European Strategy for Particle Physics

Philip Burrows



The European Strategy for Particle Physics reaches an important milestone

Geneva, 12 December 2025. At its 225th session, the CERN Council received the recommendations for the update of the European Strategy for Particle Physics, the aim of which is to develop a common vision for the future of the field...

The electron–positron Future Circular Collider (FCC-ee) is recommended as the preferred option for the next flagship collider at CERN.

It would provide a platform for a visionary physics programme addressing many of the open questions in particle physics, notably about the Higgs boson, that are critical to understanding the foundations of the Standard Model and to opening up opportunities for discovering new physics beyond the Standard Model, while at the same time driving the development of new technologies that will have a significant positive impact on society.

LhARA



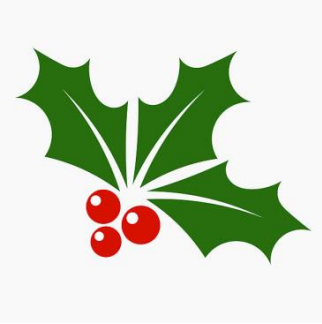
Ken Long et al

On Wednesday 9th July, the LhARA team had the pleasure of presenting to a variety of VIPs, including President Macron, as part of his state visit to the UK. The President and his team were “in town” to sign into existence a collaboration on AI between CNRS, Cambridge, Imperial, and Oxford. A new International Research Lab “ABEL” focussing on functionalised materials was also signed into existence.

LhARA was represented by Chloe Hooper, Josie, Calvin, Pat and me and Leo Cancer Care by Sophie Towe and Lisa James. Between us we presented the project/vision to many who were not aware of our mission — people from the UK, overseas, and even from Imperial. We were able to shake the President’s hand and Pat, Josie, Lisa and Sophie explained our mission with enthusiasm! Lots of contacts made; both within Imperial, with civil service, embassy, and within CNRS.

LhARA has a stand at the 2026 Royal Society Summer Science Exhibition

30 June – 5 July 2026



Merry Christmas! and a happy and prosperous 2026

