

John Adams Institute

Philip Burrows, Director

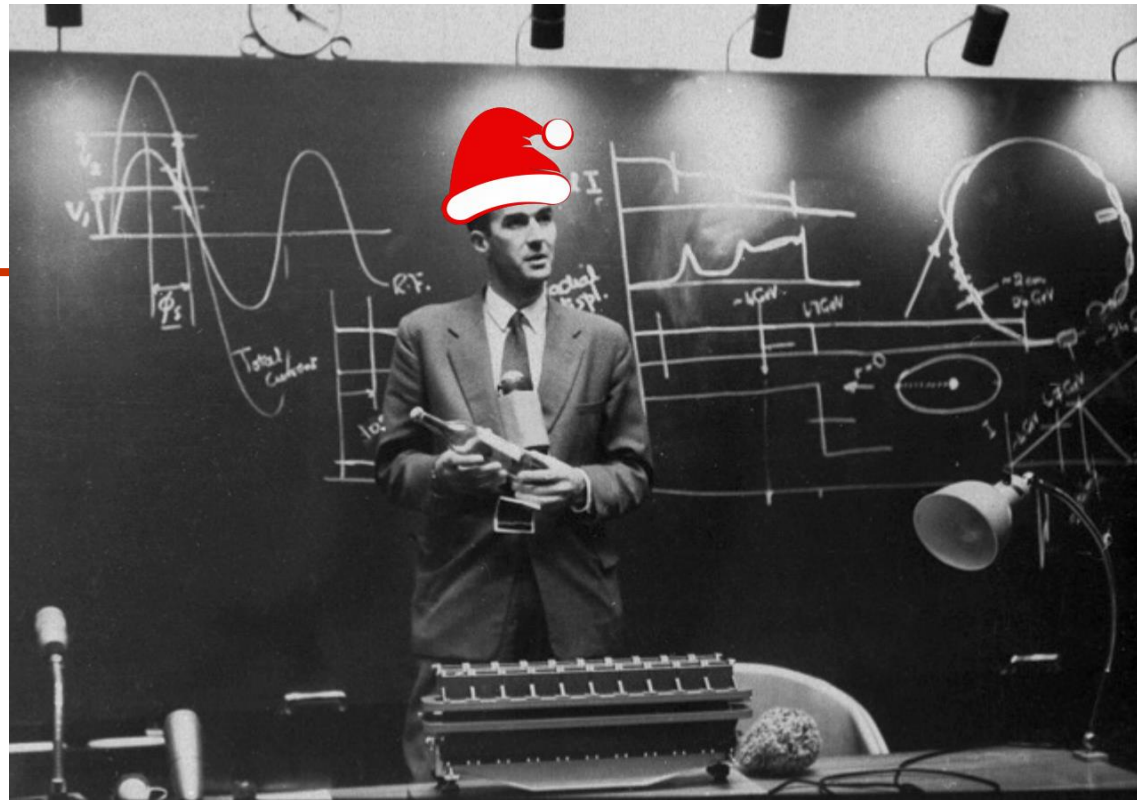


JAI Fest 2023

4/12/23

Welcome!

- **JAI Fest 2023**
- **Annual JAI family meeting**
- **Brief news / updates**
- **R&D highlights from students and postdocs**



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**

104 members:

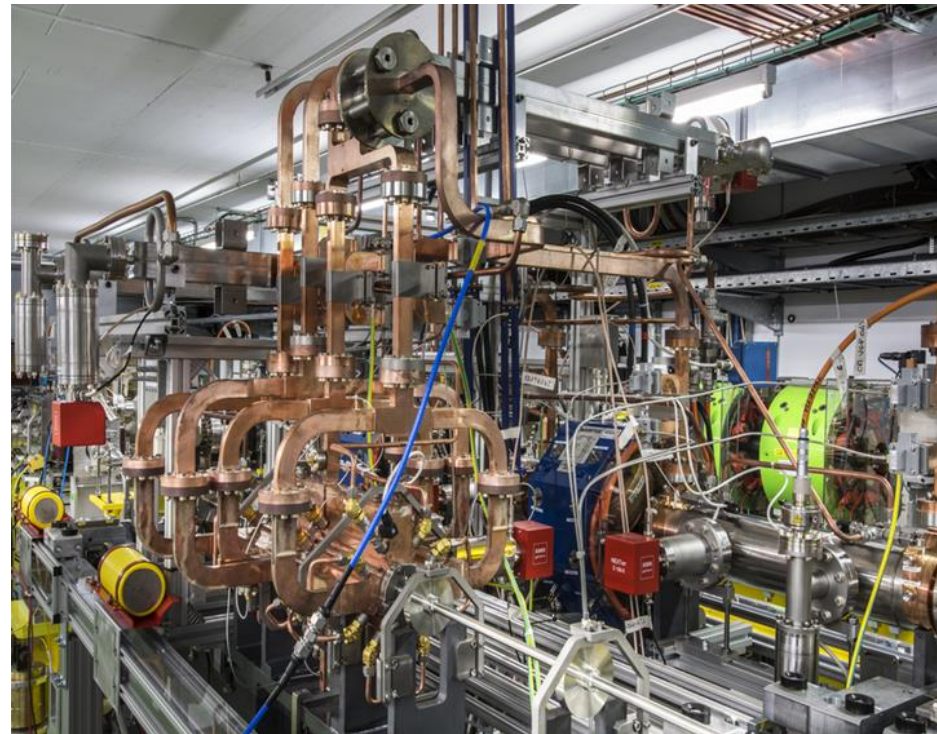
- **22 faculty**
- **30 staff**
- **52 PhD students**
- **+ 33 affiliates (STFC labs, CERN ...)**

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 Advisory Board April 2023



- **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)

Thanks to:

- **Andy Wolski** (Cockcroft)
- **Reinhard Brinkmann** (DESY)

JAI Advisory Board report (1)



The JAI continues to be a premier centre for student education in accelerator physics and technology. This is achieved by a sound curriculum at the three universities and by strong engagements both locally and in key research institutions worldwide. When looking at the curriculum and in discussing with some of the students the AB got the impression that it may be worthwhile adapting the traditional course to fully integrate modern concepts of plasma wakefield acceleration and energy sustainability from the start, such an integrated course would be welcome elsewhere.

The success of the courses derives from a solid base of faculty members contributing to the topics. While there has been an excellent hire recently for the quickly evolving topic of plasma wakefield acceleration the AB notes considerable inertia in filling long vacant positions in the respective universities. These vacancies weaken the UK role in Particle and Nuclear Physics overall, on the long run.

JAI Advisory Board report (2)



Accelerator science is undergoing rapid advances both in diagnostics and feedback and in the conception of new accelerators based on PWA. In the past, these developments have contributed to accelerator applications outside of physics research, namely in material science and in the medical area. The value of the research is undisputed. The AB thus welcomes the initiatives for commercialisation that is professionally pursued in the UK. For medical applications the obstacles are considerable and derive from the added safety aspects but also the inertia in switching to new technologies that may avail themselves. **The JAI should thus evaluate the engagements with the medical faculties to early assess the implications.**

STFC proposal call (March 2023)



STFC is taking a new approach to funding accelerator science following the publication of the new [Accelerator Strategic Framework](#):

- Community consortia are now invited to form and generate themed R&D programmes for a four-year programme of work that supports the development of UK strengths directly aligned with the Strategic Framework priorities, with an emphasis on exploiting existing facilities and the sustainable construction and operation of the UK's and CERN's priority infrastructures.
- STFC will support a few substantive (up to ~£1M/year) programmes. Outline programmes should be submitted in early 2023. These will be considered by STFC to ensure fit to the Accelerator Strategic Framework mission statement and themes, before inviting a subset to submit full proposals to be peer reviewed later that year.
- STFC aims to support work in up to three pillars:
 - LHC and its upgrades (including future machines), exploiting UK strengths aligned with the European Roadmap
 - Novel acceleration technologies (including exploiting CLARA, EPAC, and similar facilities)
 - The route to UK FEL capabilities

Funding for this call will start in April 2024 (with initial funding available from October 2023). The call is open to programmes that include industry partners.

JAI stepped up!

JAI played key roles in 4 proposals to the STFC R&D call:

Sustainable Engineering of Accelerator Systems (SEAS): Lancs, Liv, Oxford, Strath, STFC

WP4 (Burrows): systems engineering for sustainability: PDRA (£400k)

UK Muon Beams: 8 universities + STFC

WP2: muon cooling, WP4: towards a muon collider: PDRA + 3 students (£850k)

High-quality beams (H3beams): Lancs, Oxford, Manchester, Lpool, STFC

WP4 (Hooker): plasma stage, WP6 (D'Arcy): diagnostics (~£1M)

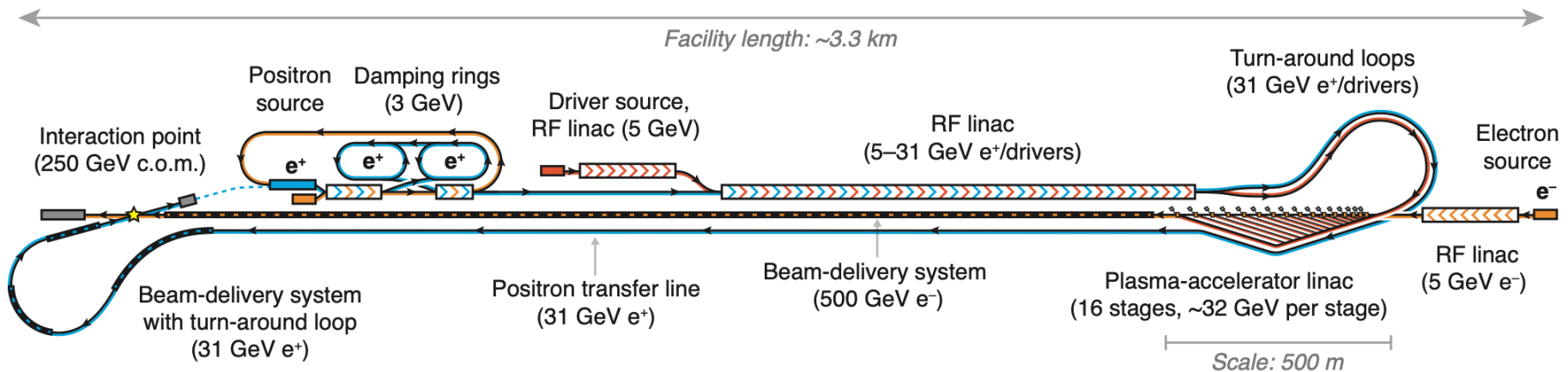
Coherent radiation sources (CRISP) (Najmudin): 6 universities + STFC

WP1 (Najmudin): mgmt, WP2 (Hooker): plasma accel + ... (>£1M)

→ only H3 beams was invited to proceed! – next call March 2024?

Beam-driven Plasma Acceleration — HALHF

A Hybrid Asymmetric Linear Higgs Factory (HALHF) Concept



Source: [Foster, D'Arcy and Lindstrøm, New J. Phys. 25, 093037 \(2023\)](#)

- > A brand new concept for a linear collider based on radio-frequency and plasma technology:
 - > Exploit the ultra-high gradients in plasma to accelerate electrons to high energy and avoid the difficulty of positron acceleration in plasma by using radio-frequency cavities to accelerate positrons to low energy
 - > Could potentially reduce the facility size (~3 km) and cost (~\$2B) by 4x compared to ILC/CLIC
 - > Also requires high-repetition-rate & high-average-power plasma operation → beyond state-of-the-art

JAI faculty

Royal Holloway:

Stephen Gibson, Pavel Karataev

Imperial College:

Ken Long, Stuart Mangles, Zulfikar Najmudin, Jaroslav Pasternak,

Juergen Pozimski, Steven Rose

Emeritus: Bucker Dangor

Oxford:

Philip Burrows, Richard d'Arcy, Simon Hooker, Peter Norreys, Armin Reichold

Visiting: Manjit Dosanjh, Ian Martin, Suzie Sheehy, Emmanuel Tsesmelis

Emeritus: Brian Foster, George Doucas, Ken Peach, Roman Walczak

Congratulations and au revoir!

Stewart Boogert

**Director,
Cockcroft Institute
(Manchester)
from March 2023**



Welcome!

Richard D'Arcy

**Appointed Associate
Professor at Oxford**

Started June 2023



Congratulations!



United Nations Office at Geneva

Working for Peace, Rights and Well-Being
International Affairs · Geneva · 103,573 followers

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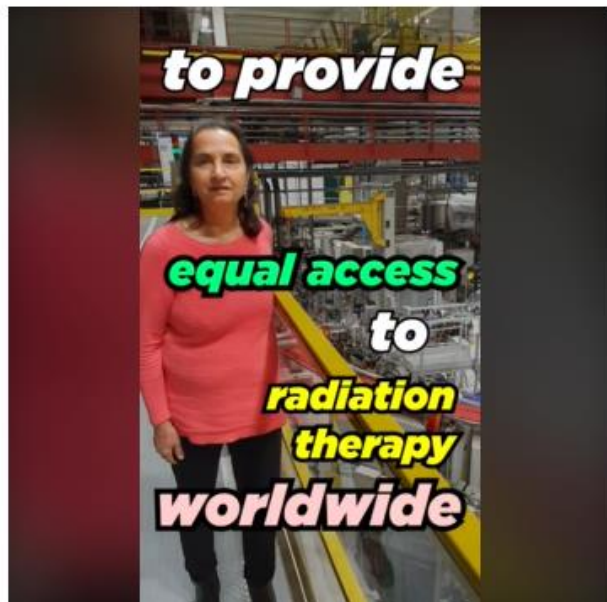
Visit website

More

Manjit Dosanjh

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IWD 2023: Manjit Dosanjh

"If I could make my way here - coming from a village in India with no water and electricity – you can do it as well. Everything is possible."

Manjit Dosanjh is a project leader for STELLA (Smart Technologies to Extend Lives with Linear Accelerators) at [CERN](#).

This month, we are celebrating women in science, tec ...see more

<https://www.facebook.com/UN.Geneva/>

https://www.instagram.com/p/CqLNS_qoKdV/

https://twitter.com/UNGeneva/status/1639297269135540224?ref_src=twsrc%5Egoogle%7Ctwcamp%5Eserp%7Ctwgr%5Etweet

<https://www.linkedin.com/company/ungeneva/videos/>

Congratulations!

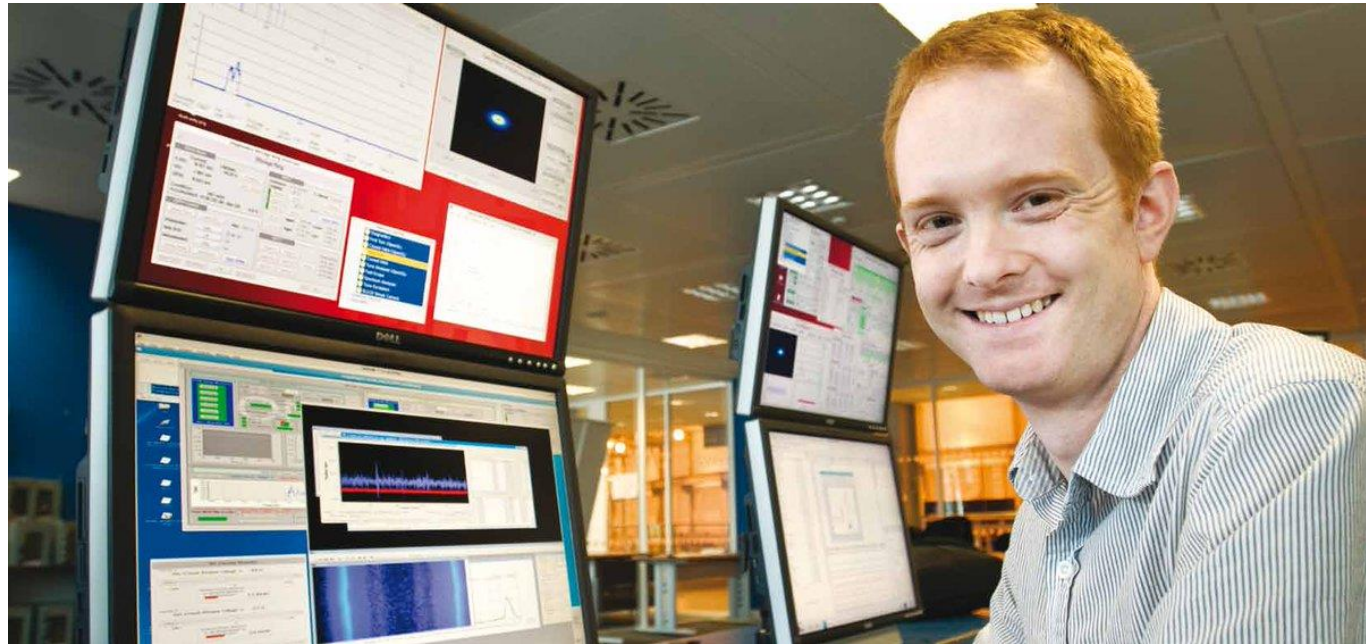
Peter Norreys

2023 American Nuclear Society
Edward Teller Medal Award
for “pioneering research in the
use of high-intensity lasers for
producing unique electron,
ion, and x-ray beams for
scientific applications in fast
ignition fusion, advanced
accelerators and probing of
plasmas”.



Congratulations!

Ian Martin



Appointed Visiting Professor at Oxford

Congratulations!

Philip Burrows

**Appointed to CERN
Scientific Policy
Committee**



JAI staff

Imperial College:

Michael Backhouse, Claudia Cobo Torres, Michael Bloom, Ollie Ettliger, Brendan Kettle, Ajit Kurup, Eva Los, Jonathan Wood

Oxford:

Vittorio Bencini, Douglas Bett, Matthew Capstick, James Chappell, James Cowley, Linus Feder, Riyasat Husain, Pierre Korysko, Mark Jones, Jubin Mitra, Peter Qiu, Phill Tait, Marko von der Leyen, Hannah Wakeling, Weida Zhang

Royal Holloway:

Paul Bamford, Gary Boorman, Alessio Bosco, Richard Elsom, Alexey Lyapin, Mark McCallum, William Shields

Farewell!

Riyasat Husain

**→ INDUS Light Source,
Indore**



Farewell!

Matthew Capstick

→ Geneva startup



Farewell!

Ben Chen

→ Univ Oslo (HALHF)



Farewell!

**Rakesh Kumar
Yembadi**

→ TIFR Hyderabad



Farewell!

Rory Baggott

→ Private company



Farewell!

Jon Wood

**→ Coordinator + Team
Leader, FLASHForward**



Welcome!

Hannah Wakeling

Sustainability of ISIS upgrade



James Cowley

FLASHForward



Welcome!

Claudia Cobo Torres

AWAKE



Michael Backhouse

LWFA



Welcome!

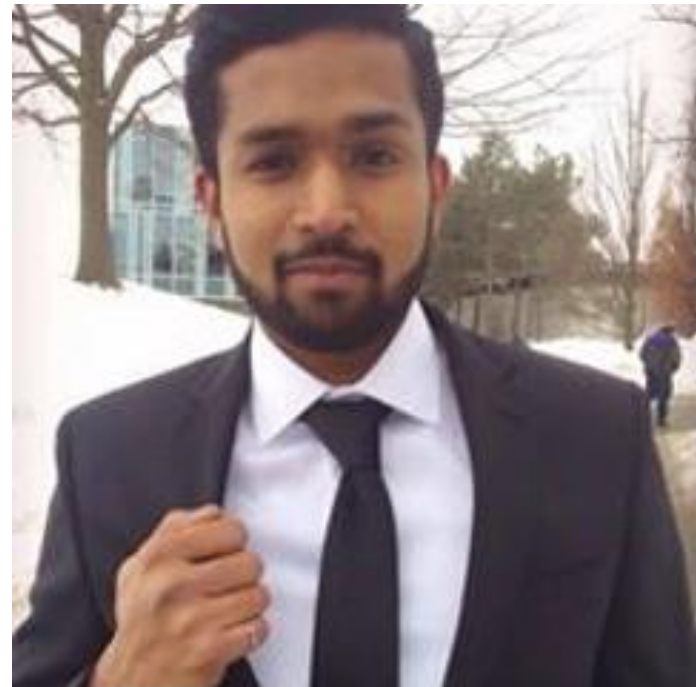
Nuo Xu

AWAKE + laser development



Sanjith Chandran

Technical



JAI students

Oxford:

Emily Archer, Pablo Arrutia Sota, Joe Bateman, Darren Chan, Sasha Horney, Emily Howling, Abigail James, Carl Jolly, Sebastian Kalos, Samuel Leadley, Corey Lehmann, David McMahon, Vlad Musat, David Posthuma de Boer, Shaun Preston, Cameron Robertson, Jack Salvesen, Bethany Spear, Max Topp-Mugglestone, Johannes Van de Wetering, Seb Wilkes, Wei Ting Wang

Imperial College:

Meriam Berboucha, Laurence Bradley, Ginevra Casati, Gregory Christian, Jan-Niclas Gruse, Anna Gunn, Jasmin Hills, Adam Hughes, Rohan Kamath, Lewis Kennedy, Ta Jen Kuo, Runfeng Luo, Maria Maxouti, Rehanah Razak, Rebecca Taylor, Wei Wu

Royal Holloway:

Majid Ali, Thomas Bass, Max Bosman, Daniele Butti, Alec Clapp, Marin Deniurd, Helene Guerin, Thomas Hyatt, Alex Keykan, Mark McCallum, Robert Murphy, Giusy Passarelli, Matt Pereira, Florian Stummer

PhD graduates (2023)

Rob Williamson

→ **ISIS staff**

Jake Flowerdew

→ **CERN Fellow**

Titus Dascalu

→ **PDRA Lancaster**

Carlo Mussolini

→ **AI start-up, London**

Collette Pakuza

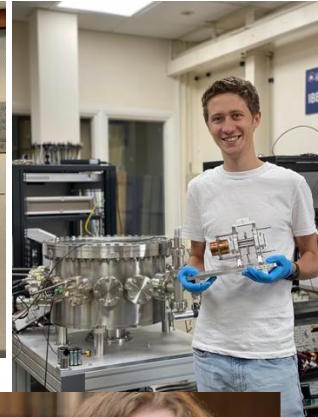
→ **CERN Fellow**

Aimee Ross

→ **ASML, Eindhoven**

Daniele Butti

→ **CERN
Fellow**



PhD graduates (2023)

Siobhan Alden

→ RHUL PDRA



Thomas Bass (MSc)



Michael Backhouse

→ PDRA ICL



Nuo Xu

→ PDRA ICL



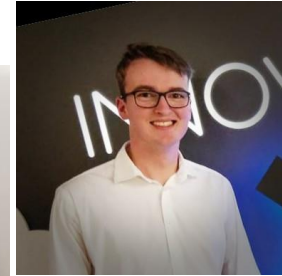
Eva Los

→ PDRA ICL

Welcome class of 2023!

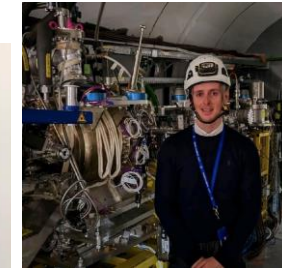
Oxford:

**Carl Jolly
Samuel Leadley
Corey Lehmann
Shaun Preston**



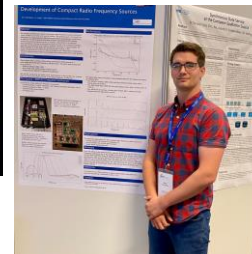
Imperial:

**Laurence Bradley
Jasmin Hills
Lewis Kennedy
Gregory Christian**



RHUL:

**Thomas Hyatt
Mark McCallum
Giusy Passarelli
Matt Pereira**



Congratulations!

Joe Bateman:

Poster Prize

VHEE Radiotherapy Conference,
Hamburg



Congratulations!

Alex Picksley:

Culham thesis prize



Congratulations!

Jack Salvesen:

John Adams Prize

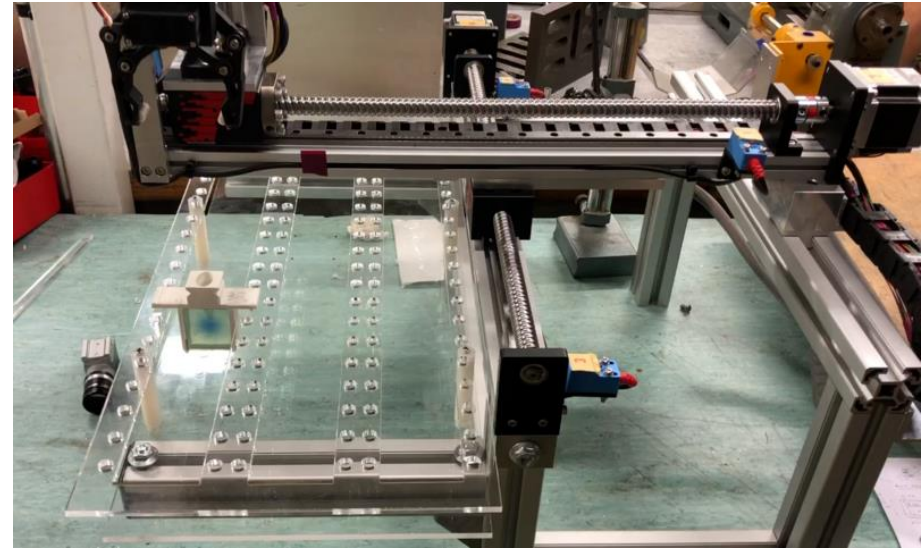


Class of 2022 visit to CERN (July 2023)



CERN summer interns

Ibrahim Najmudin



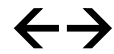
Lorenzo Tranchedone



JAI seminars

thanks to Emmanuel

JAI accelerator seminar



UK accelerator seminar series

<https://indico.cern.ch/event/1330586/timetable/>

UK Accelerator Institutes Seminar Series Autumn 2023 (Session 8)


12 Oct 2023, 16:15 → 30 Nov 2023, 17:15 Europe/London

Emmanuel Tsesmelis (CERN) , Ian Bailey (Lancaster University / Cockcroft Institute of Accelerator Science and Technology) ,
Lee Jones (ASTeC (STFC Daresbury Laboratory) & The Cockcroft Institute) , Oznur Apsimon (University of Manchester (GB))

Description **UK Accelerator Institutes Seminar Series**



Further abstracts will be added in due course. Seminar slides and recordings can be found in the timetable.

 [Join Zoom Meeting](#)



THURSDAY, 12 OCTOBER

16:15 → 17:15 **Medical Accelerator Research in Australia: Developing Advanced Accelerators for Future Needs**

1h

In this seminar I will give an overview of some of the research projects underway in the Medical Accelerator Physics group at the University of Melbourne, with a focus on the future potential of novel accelerator technologies in Australia. In 2023, our group inaugurated the first southern hemisphere X-band accelerator facility, on-track to realise a compact electron accelerator R&D lab with the X-LAB 'X-band Laboratory for Accelerators and Beams'. I will also overview how a scaled experimental technology demonstrator – the TURBO 'Technology for Ultra Rapid Beam Operation' project – aims to speed up particle therapy.

Speaker: Dr Suzie Sheehy (University of Oxford and University of Melbourne)

 20230910-UKAccel...  20230910-UKAccel...

JAI special seminar 8/12/23 15:00

Dr Adrian Oeftiger (GSI)

**On the Space Charge
Limit in Synchrotrons –
and How to Push it Further!**



<https://zoom.us/j/94748201604?pwd=YWErNnJWK1RpUHB3RmlHNC9PSWkyZz09>

Today's programme (1)

	Welcome and unofficial JAI bingo <i>Denys Sciama Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	09:50 - 10:00
10:00	Director's report <i>Denys Sciama Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Philip Nicholas Burrows</i> 10:00 - 10:30
	The environmental impact of the ISIS-II Neutron and Muon Source <i>Denys Sciama Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Dr Hannah Wakeling</i> 10:30 - 10:50
11:00	Head-Tail Instability Predictions for the ISIS Synchrotron <i>Denys Sciama Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>David Posthuma de Boer</i> 10:50 - 11:10
	Tea / coffee break <i>Level 5 Foyer, Denys Wilkinson Building, Oxford</i>	11:10 - 11:30
	The ZHI Laser - a 100Hz laser for laser-matter interactions	<i>Oliver Ettlinger</i> 11:30 - 11:50
12:00	Pulse characterisation techniques for multi-pulse laser plasma wakefield accelerators	<i>Warren Wang</i> 11:50 - 12:10
	Optimising electron beams from a laser wakefield accelerator using machine learning	<i>Michael Backhouse</i> 12:10 - 12:30
	Observation of electron energy loss in strong fields with Bayesian inference and model selection	<i>Eva Los</i> 12:30 - 12:50
13:00	Lunch	

Today's programme (2)

	<i>Level 5 Foyer, Denys Wilkinson Building, Oxford</i>	13:00 - 14:00
14:00	Toward precise beam injection into the AWAKE experimen <i>Denys Sciamia Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Vittorio Bencini</i> 14:00 - 14:20
	Cherenkov and High frequency Beam Position Monitors for the AWAKE common beamline <i>Denys Sciamia Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Bethany Spear et al.</i> 14:20 - 14:40
	Cherenkov diffraction radiation studies at Diamond Light Source <i>Denys Sciamia Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Alec Clapp</i> 14:40 - 15:00
15:00	Design and testing of the CLIC Two Beam Module alignment systems <i>Denys Sciamia Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Matthew John Capstick</i> 15:00 - 15:20
	Tea/ coffee break <i>Level 5 Foyer, Denys Wilkinson Building, Oxford</i>	15:20 - 15:50
16:00	Development of beamlines for CERN's future fixed target experiments <i>Denys Sciamia Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Florian Wolfgang Stummer</i> 15:50 - 16:10
	On noise and perturbations for operating the latest generation of light sources <i>Denys Sciamia Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Seb Wilkes</i> 16:10 - 16:30
	Life after JAI <i>Denys Sciamia Lecture Theatre, Denys Wilkinson Building, Keble Rd, Oxford OX1 3RH</i>	<i>Chetan Gohil</i> 16:30 - 16:50
17:00	After Party: Drinks and nibbles	

JAI Fest 2023

Let's enjoy the day!