

John Adams Institute

Philip Burrows, Director



JAI Advisory Board

- **Bill Barletta** (ex-LBNL, MIT/UCLA)
- **Reinhard Brinkmann** (DESY)
- **Oliver Bruning** (CERN)
- **Jonathan Dorfan** (SLAC)
- **Andy Wolski** (Cockcroft)
- *Eckhard Elsen* (ex-CERN, DESY)
- *Christoph Quitmann* (ex-MAXIV, Research Instruments)
- *Akira Yamamoto* (KEK, CERN)

Thanks to:

- **Oliver Heid** (ex-Siemens)
- **Nobu Toge** (KEK)

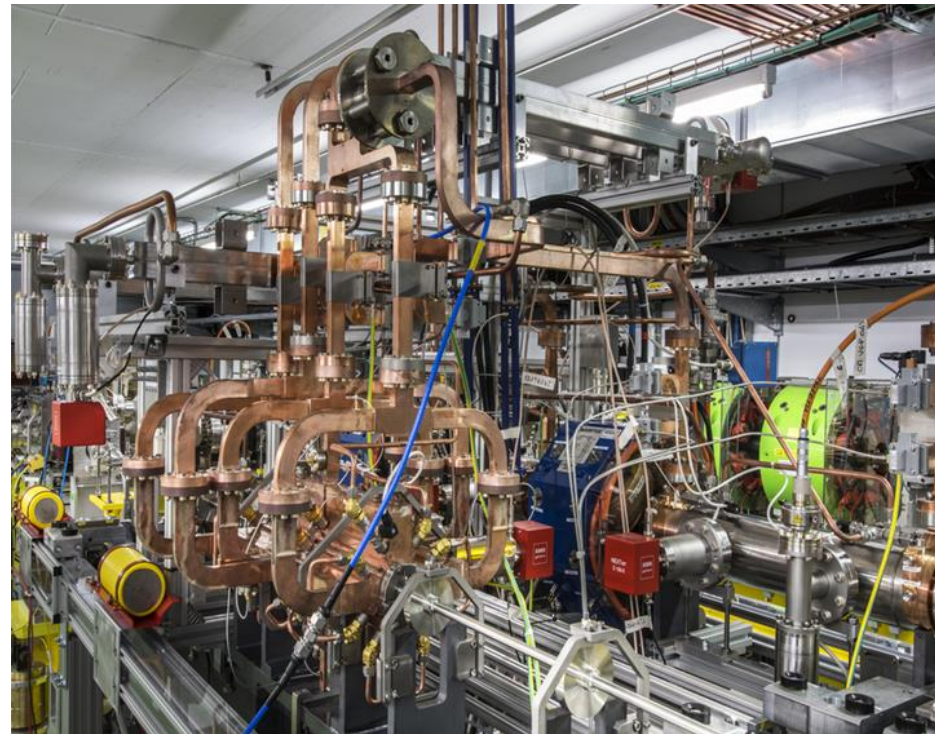
Outline

- **JAI mission + overview**
- **Faculty/staff updates**
- **Funding**
- **Strategy**
- **Programme covered by the following speakers!**

JAI Mission



A centre of excellence for advanced and novel accelerator technology, providing expertise, research, development and training in accelerator techniques, and promoting 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**

> 100 personnel:

- **22 faculty**
- **32 staff**
- **48 PhD students**
- **+ 33 affiliates (STFC labs, CERN)**

Key expertise (faculty + core staff)

Beam dynamics

Boogert, Burrows, Pasternak, Pozimski, Sheehy, Tsesmelis

Beam instrumentation, feedback & control

Bett, Boogert, Boorman, Burrows, Gibson, Karataev, Lyapin, Reichold

RF systems

Bett, Foster, Lyapin, Zhang

Metrology & alignment systems

Reichold

Laser + plasma systems

Foster, Hooker, Mangles, Najmudin, Norreys, Rose, Walczak

Medical beamlines

Dosanjh, Long, Pasternak, Pozimski, Sheehy

Accelerator R&D projects

Particle physics colliders and beamlines

Bett, Boogert, Boorman, Burrows, Foster, Gibson, Karataev, Lyapin, Reichold, Zhang

Light sources

Boogert, Burrows, Karataev, Lyapin

Intense hadron beams

Boorman, Gibson, Long, Pasternak, Pozimski, Sheehy

Advanced acceleration techniques

Burrows, Foster, Hooker, Mangles, Norreys, Najmudin, Rose, Walczak

Societal applications

Dosanjh, Long, Najmudin, Pasternak, Pozimski, Reichold, Sheehy

STFC core grant award

April 2021 – March 2025



£6.5M 'resource' + £0.6M equipment + £170k equipment 'bonus'

Research staff effort as requested

Capital equipment as requested

Reduced travel, consumables, admin + faculty time support

No funding for project students

Also receive 3 STFC quota PhD students annually

Key features of STFC core grant



Focus (~2/3 of total) on 'PP accelerators' (including AWAKE)

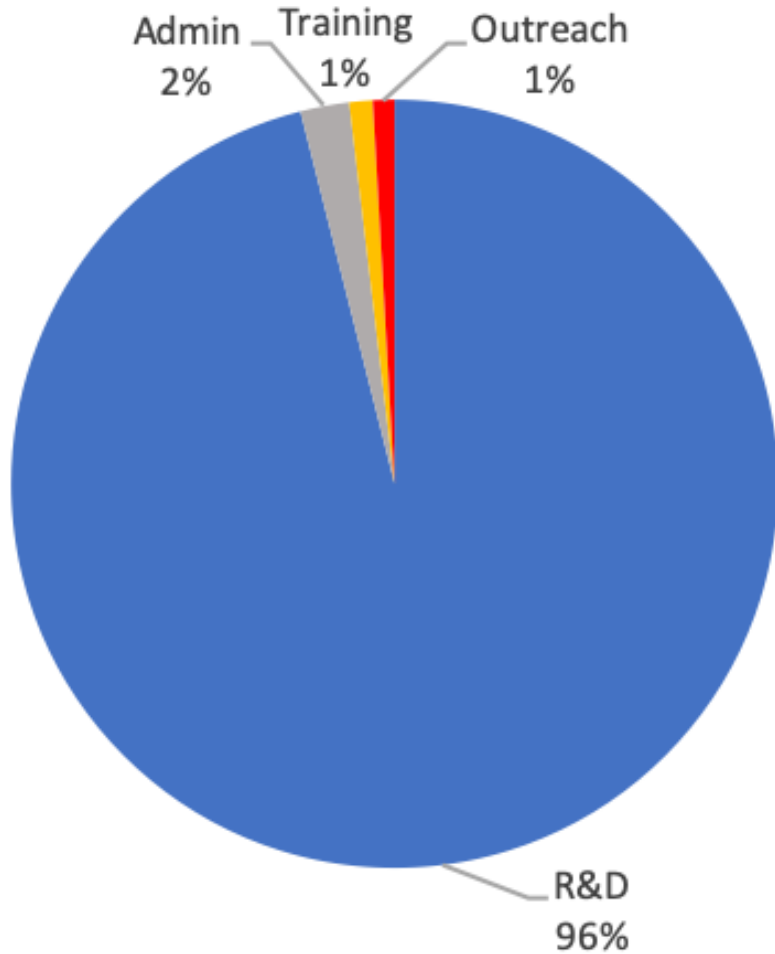
- anchored in CERN programme (HL-LHC, AWAKE, CLIC, PBC)
- capitalises on UK investment in CERN ('our lab!')
- directly supports STFC high-priority projects + UK PP programme

Platform for advanced accelerator R&D

+ for supporting national laboratories: CLF/EPAC, DLS(II) + ISIS(II)

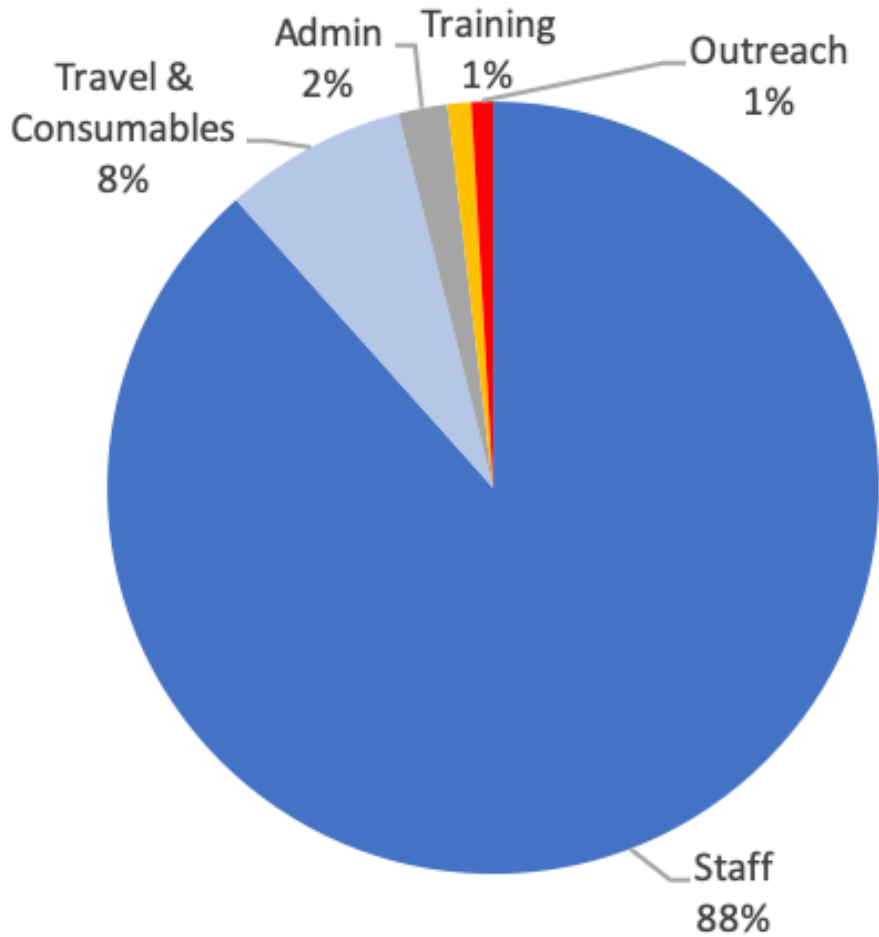
Increasing emphasis on societal (medical) applications

Resource allocation



96% R&D

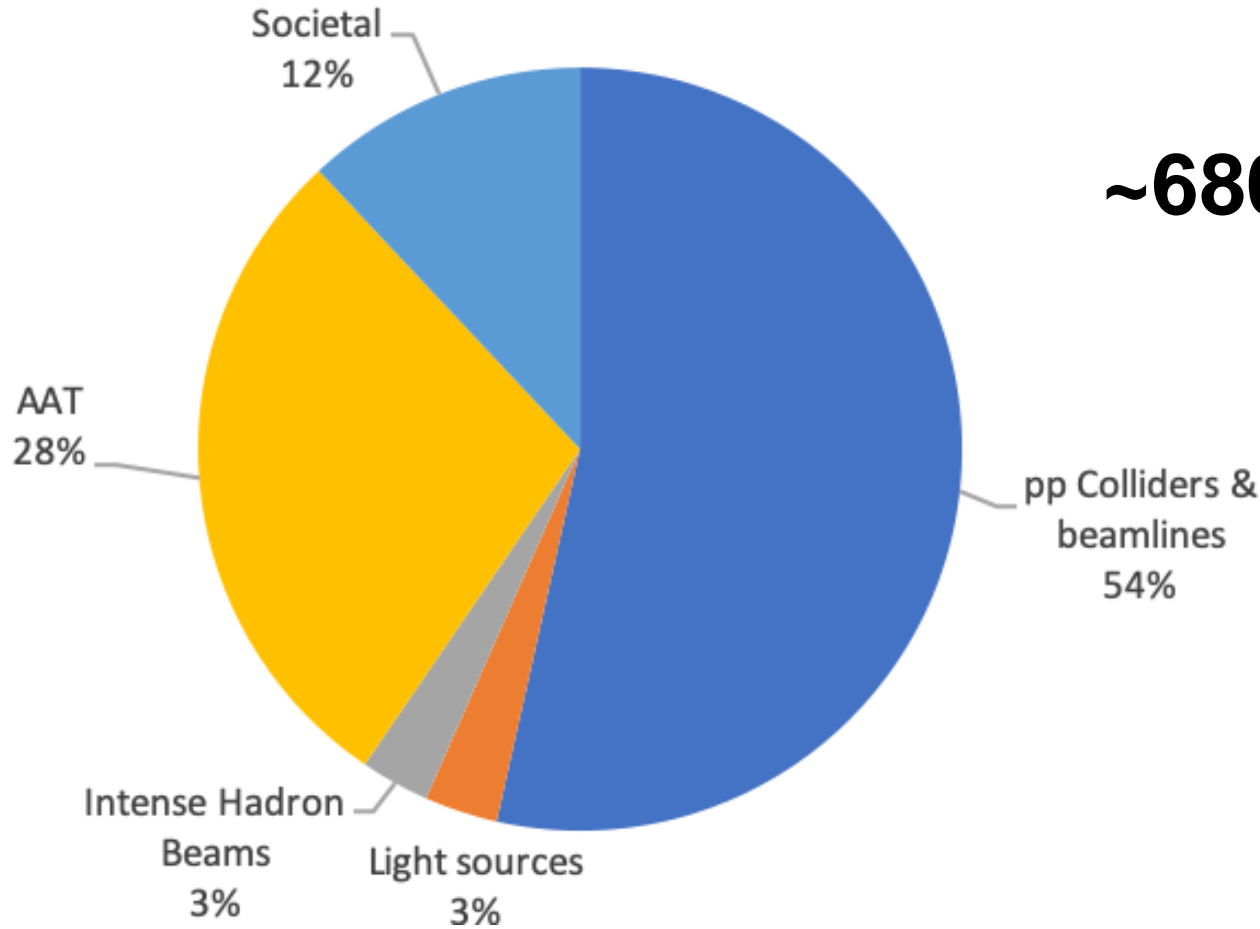
Resource allocation



88% **staff**
8% **T&C**

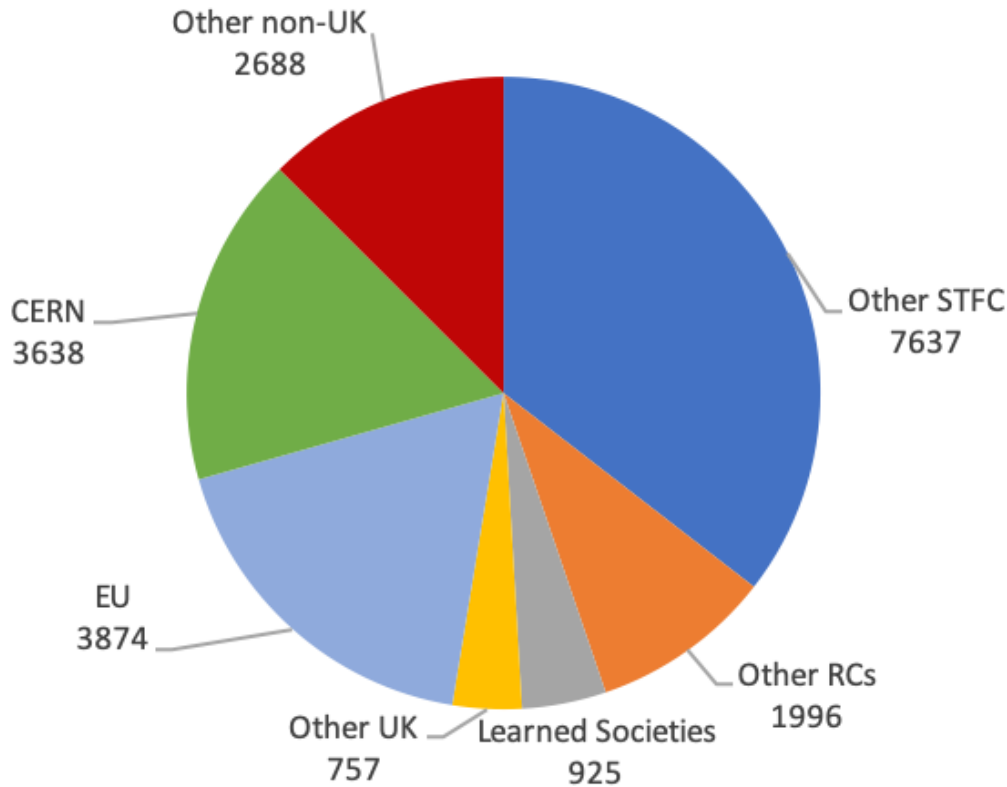
Staff distribution

(STFC core grant)



~680 staff months
(39 people)

Leveraged resources

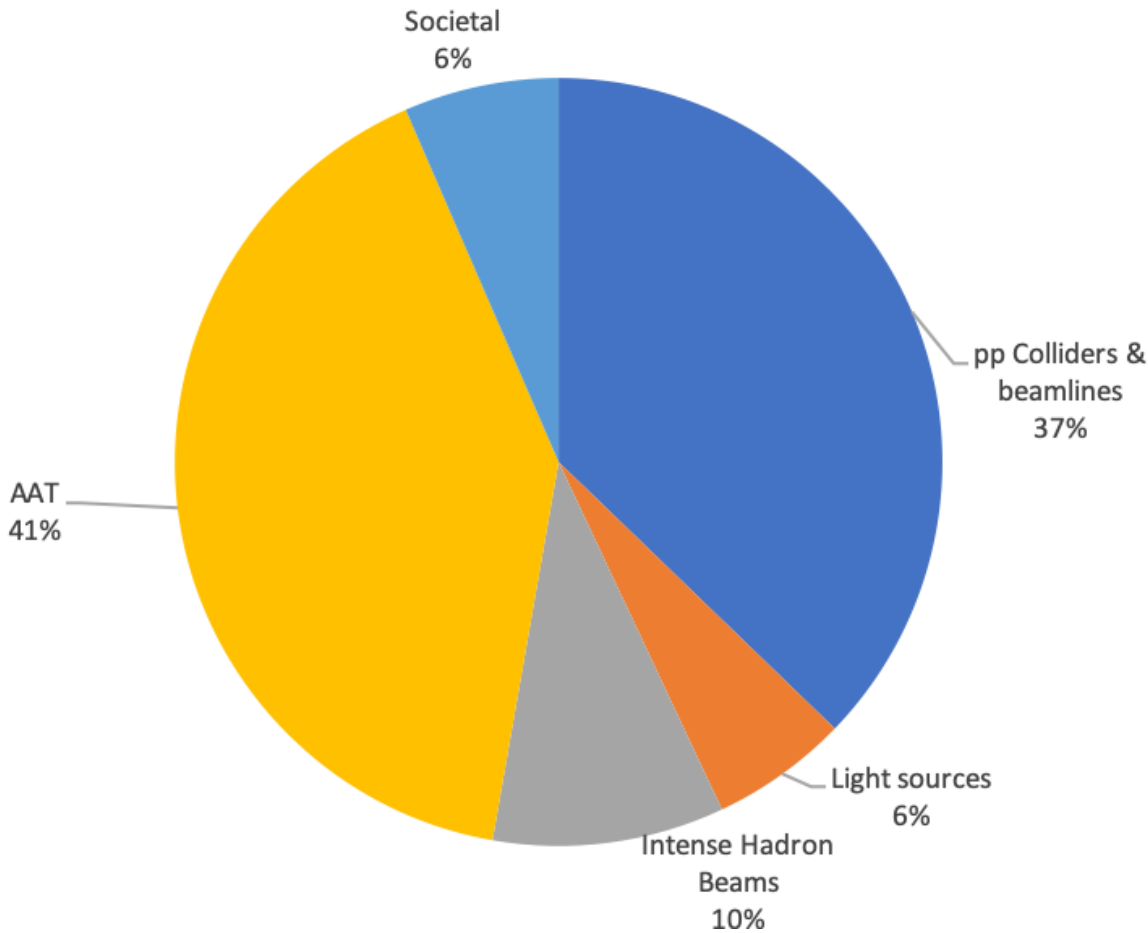


Breakdown of leveraged funding overlapping with grant period 2017-21 (£K)

**Total: £26M
(includes £4.6M facilities access not shown)**

Personnel distribution

(All funding sources)



**Complete
JAI personnel
deployment
including students**



Covid19 impacts

- During Covid era, JAI functioned very effectively, largely via virtual interactions
- **Monitor and support all our personnel, especially if unable to work 'on site'**
- 6 PDRAs + 10 doctoral students on LTA at CERN working safely and effectively
- Laboratory work proceeded (at a lower level) subject to Covid safety measures
- 18 PhD students graduated and secured excellent positions
- Admitted 18 PhD students in classes of 2020 and 2021

PhD graduates (2021)

Jan-Niclas Gruse

→ consultant/data science, Berlin



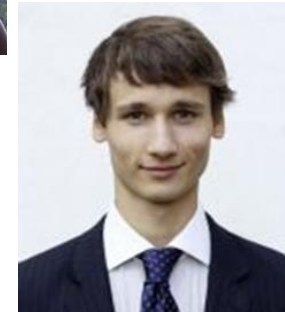
Jakob Jonnerby

→ PDRA, IC



Ji Li

→ fellow, IoP Beijing



Marko Mayr

→ PDRA ALP/Oxford

Alex Picksley

→ PDRA, BELLA / LBNL



Robbie Watt

→ PDRA, SLAC

Kirill Fedorov

→ PDRA RAL/CLF

Andrei Olenik

→ Russia



Andrei Olenik



Pyroelectrics

Kirill Fedorov



Diagnostics

Welcome class of 2021!

Alec Clapp
Florian Stummer
David McMahon
Bethany Spear
Johannes van de Wetering
Seb Wilkes
Annabel Gunn
Maria Maxouti
Josie McGarrigle



**ODR BPMs / Diamond
CERN beamlines**

laser wakefield acceleration
AWAKE

laser wakefield acceleration

Diamond Light Source upgrade

high-power MIR lasers/accelerators

LHARA/ion sources



AWAKE



Guests:

Fern Pannell

(UCL)

Namra Aftab

(HU-B)

Sandeep Mohantray

(HU-B)

Covid19 impacts

Concerns:

- **Some students delayed in starting at CERN due to STFC travel restrictions**
- **Hands-on project work has been impacted**
- **Facility access reduced → delays + curtailment of experimental programmes (eg. CLF)**
- **Delays in hiring of staff**
- **In-person public engagement + outreach has been limited**
- **Research Council funding unlikely to increase substantially in near term**

Faculty/staff updates

Oxford: Particle Physics strategic hiring plan includes 3 JAI faculty appointments:

- 1) hadron beams
- 2) advanced acceleration
- 3) particle-beam therapy

→ negotiations currently in progress with leading candidate

Imperial: No change

RHUL: Stewart Boogert returned to full-time research

Au revoir!

Suzie Sheehy

**Now full-time senior lecturer
at Melbourne University**

**Appointed Visiting Lecturer
at Oxford**



Connections - Diamond

Strong links in particular with Accelerator Physics, Diagnostics + Controls groups

PhD students (* = joint JAI/DLS):

Ji Li *	(Oxford)	graduated 2021
Dan Harryman	(RHUL)	graduated 2021
Niki Vitoratu *	(RHUL)	graduated 2020
Seb Wilkes *	(Oxford)	started October 2021
Alec Clapp *	(RHUL)	started October 2021

Joint PDRA (Oxford):

Maxim Korostelev	2018-21
Riyasat Husain	starts July 2022

Connections - ISIS

Strong links with Intense Beams and Operations groups

PhD students (Oxford):

Jake Flowerdew	IBEX Paul trap
Max Topp Mugglestone	beam dynamics
Rob Williamson	ISIS staff
David Posthuma de Boer	ISIS staff
Peter Griffin-Hicks	ISIS staff

Joint PDRA (Oxford):

Emi Yamakawa	2018-21
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Connections - international

CERN

LHC, HL-LHC, AWAKE, Physics Beyond Colliders ...

DESY

FLASHForward, LUXE ...

KEK

Accelerator Test Facility (ATF/ATF2)

BNL

Accelerator Test Facility

SLAC

NLCTA, ESA test beam, FACET, FACET2

Strategic level - UK

- Cockcroft Institute:
 - Gibson** on CI Scientific Advisory Committee
 - Wolski on JAI Advisory Board
- ASTeC (Daresbury):
 - Burrows** on ASTeC Advisory Board
- JAI, CI, ASTeC work together very closely in the UK project teams on:
 - ILC + CLIC, HL-LHC, AWAKE, UK FEL ...**
- Central Laser Facility (CLF) + Extreme Photonics Applications Centre (EPAC)
- STFC:
 - Najmudin** Science Board (SB)
 - Burrows** PP Technology Advisory Panel (PPTAP)
 - Long** Technology & Accelerator Advisory Board (TAAB)
 - Gibson** Projects Peer Review Panel (PPRP)
- UKRI: **Foster** Infrastructure Advisory Committee (IAC)
- UK: **Burrows** Physics Panel, Research Excellence Framework (REF)

EU Projects

Faculty provide scientific leadership + coordination in many EU projects

Previous:

EUCARD 1 + 2

TIARA

HiGRADE

EJADE

EuPRAXIA → **on ESFRI roadmap**

EuroCirCOL

Ongoing:

ARIES (2018-22)

I.FAST (2021-25)

Submitted:

EAJADE

In preparation:

Muon collider design study

CREATE (Compact & Resource Efficient Accel. Technologies)

JAI programme

today's presentations

Particle physics colliders and beamlines

Intense hadron beams

Light sources

Advanced acceleration techniques

Medical beamline applications:

VHEE/FLASH/STELLA

ITRF/LHARA

Industrial applications and connections:

Commercialisation of metrology

BDSIM + further industry

Training and public engagement

Design study: FCCee

Stephen Gibson

Peter Griffin-Hicks

Ian Martin

Zulfikar Najmudin

Manjit Dosanjh

Nick Dover

Armin Reichold

Laurie Nevay

Emmanuel Tsesmelis

1st year students

Extra material

For reference if needed

JAI and European Strategy

- European Strategy for Particle Physics Update (2020)
Burrows Scientific Secretary for accelerators
- European Committee for Future Accelerators
Boogert, Burrows UK delegates
- European Lab Directors' Group accelerator R&D roadmap:
Tesmelis (Scientific Secretary)
Hooker (high-grad accel, plasma), Long (muon beams)
- European project coordination: TIARA, EuPRAXIA, ARIES, I.FAST, EuroCircol, FCCIS, EJADE ...
Bartolini, Boogert, Burrows, Foster, Hooker, Long, Najmudin, Walczak

JAI faculty

Royal Holloway:

Stewart Boogert, Stephen Gibson, Pavel Karataev

Imperial College:

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

Juergen Pozimski, Steven Rose

Emeritus: Bucker Dangor

Oxford:

Philip Burrows, Brian Foster, Simon Hooker, Peter Norreys,

Armin Reichold, Suzie Sheehy, Roman Walczak

Visiting: Manjit Dosanjh, Emmanuel Tsesmelis, Richard Walker

Emeritus: George Doucas, Ken Peach

Congratulations!

Suzie Sheehy

**Taking up senior
lectureship at
Melbourne University**

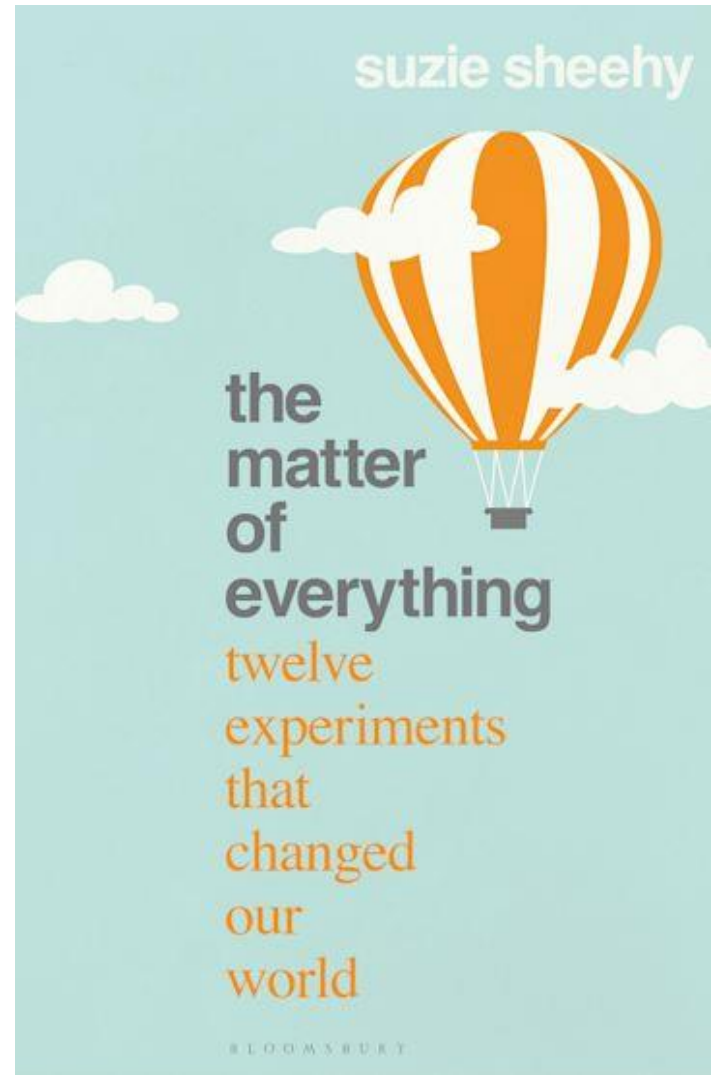


Congratulations!

Suzie Sheehy

**New book about to be
published**

**Appointed to IUPAP
Working Group 14
(Accelerators)**



Congratulations!

Bucker Dangor

2021 IoP Michael Faraday Medal and Prize

for outstanding contributions to experimental plasma physics, and in particular for his role in the development of the field of laser-plasma acceleration



Congratulations!

Steve Rose

**Fellow of the American
Physical Society**



Congratulations!

Philip Burrows

**Council of the
Institute of Physics**



JAI staff

Imperial College:

**Saleh Alatabi, Rory Baggott, Ben Chen, Ollie Ettliger, George Hicks,
Brendan Kettle, Rakesh Kumar Yembadi, Ajit Kurup**

Oxford:

**Vittorio Bencini, Douglas Bett, James Chappell, James Cowley,
Linus Feder, Johan Fopma, Hector Garcia Morales, Pierre Korysko,
Mark Jones, Jubin Mitra, Peter Qiu, Phill Tait, Emi Yamakawa, Weida Zhang**

Royal Holloway:

**Alberto Arteche, Paul Bamford, Gary Boorman, Alessio Bosco,
Richard Elsom, Alexey Lyapin, Mark McCallum, Laurie Nevay,
William Shields**

Welcome!

Ben Chen

Discharge development and modeling for AWAKE (IC)



Rakesh Kumar Yembadi

High rep-rate laser wakefield accelerators (IC)



Welcome!

James Chappell

Laser-plasma accelerators (OX)



Linus Feder

Laser-plasma accelerators (OX)



Welcome!

Vittorio Bencini

PDRA – AWAKE (OX)



Matthew Capstick

Engineer – CLIC module (OX)



Welcome!

Mark McCallum

RA – industrialisation in
accelerator electronics (RHUL)



Congratulations!

Emma Jane Ditter

→ PDRA Cambridge



Andrey Abramov

→ CERN Fellowship



Congratulations!

Rebecca Ramjiawan

→ CERN Fellowship



Emi Yamakawa

→ Staff position, ISIS



Congratulations!

Rob Shalloo

Haines Prize for outstanding
young researcher,
IOP Plasma Physics Group



JAI students

Oxford:

Emily Archer, Pablo Arrutia Sota, Joe Bateman, Luke Dyks, Jake Flowerdew, Peter Griffin-Hicks, Oscar Jakobsson, David McMahon, Carlo Mussolini, Collette Pakuza, David Posthuma de Boer, Cameron Robertson, Aimee Ross, Bethany Spear, Max Topp-Mugglestone, Johannes Van de Wetering, Seb Wilkes, Robert Williamson, Wei Ting Wang, Laurence Wroe

Imperial College:

Michael Backhouse, Meriame Berboucha, Cary Colgan, Titus-Stefan Dascalu, Elias Gertschmayer, Jan-Niclas Gruse, Anna Gunn, Adam Hughes, Paul Jurg, Hin Tung Lau, Eva Los, Maria Maxouti, Rohan Prasad, Rebecca Taylor, Robbie Watt, Wei Wu, Nuo Xu

Royal Holloway:

Siobhan Alden, Majid Ali, Daniele Butti, Theodoros Christodoulou, Alec Clapp, Gian Luigi D'Alessandro, Helen Guerin, Daniel Harryman, Helena Lefebvre, Robert Murphy, Florian Stummer

Welcome class of 2021!

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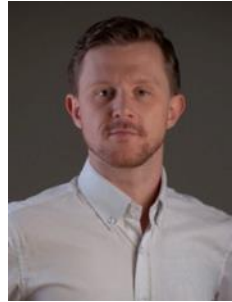
Sandeep Mohantray

(HU-B)

Congratulations on completing PhD!

Jan-Niclas Gruse

→ consultant/data science, Berlin



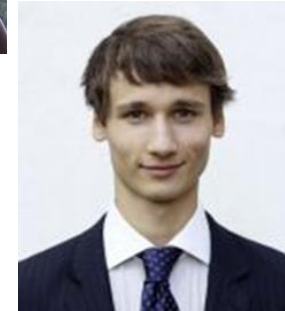
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Alex Picksley

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Robbie Watt

→ PDRA, SLAC

Kirill Fedorov

→ PDRA RAL/CLF

Andrei Olenik

→ Russia



Andrei Olenik



Pyroelectrics

Kirill Fedorov



Diagnostics

Congratulations!

Laurence Wroe:

Linacre College

Keene Domus Research Prize

for excellent research communication skills

**Oxford Project Engagement with Research
Seed Fund**

*'Funky-Shaped Drums and Particle Accelerators'
schools workshop for 11-14 year-olds*



Congratulations!

to H el ene Guerin



Welcome Oscar!

