

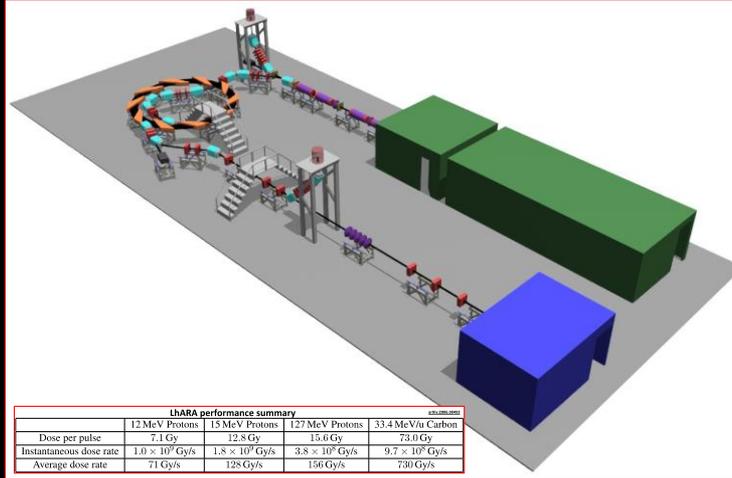
Welcome, introduction and thanks!

Impact:
clinical & industrial

LhARA Project

Biological Science

MRes activity with
Leo Cancer Care
Ideas; still need to
develop



08Feb23

Making a start on developing the biological pillar:

- MRC “Developmental Pathway Funding Scheme”:
 - <https://www.ukri.org/opportunity/developmental-pathway-funding-scheme/>
 - A.Giacca, J.Parsons developing outline proposal
- Need Biological Science CM ...

Our mission is to:

- ***Deliver a systematic and definitive radiation biology programme***
- ***Prove the feasibility of laser-driven hybrid acceleration***
- ***Lay the technological foundations for the transformation of PBT***
 - automated, patient-specific proton and ion beam therapy



Science and
Technology
Facilities Council



18-month review of our programme today/tomorrow

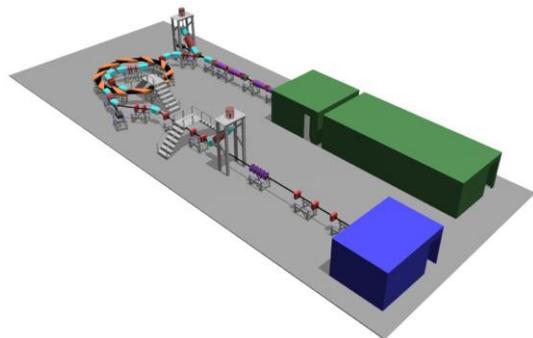
2-year Preliminary Activity – Project start 01Oct22

J. Clark, M. Noro, A. Woodcock

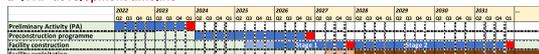
14Jun21

Ion Therapy Research Facility

1. Schematic diagram of the Ion Therapy Research Facility



2. ITRF development timeline



3. Institutes that make up the ITRF collaboration



June 1, 2022

CCAP-TN-10 (2022)



The Laser-hybrid Accelerator for Radiobiological Applications

R&D proposal for the preliminary, pre-construction phases

The LhARA collaboration

P. Allport¹, A. Aymer², C. J. Baker³, J. Bambar⁴, P. Beard⁵, T. Becker⁶, S. Benson⁷, A. Bejiri⁸, W. Bertsche^{9,10}, R. Bingham^{11,12}, N. Bliss¹³, E. Boella^{14,10}, S. Boogaart^{15,16}, M. Borghesi¹⁷, P.N. Burrows^{18,19}, A. Carabe^{20,21}, M. Charlton³, J. Clarke¹³, B. Cox⁵, T.S. Dascalu²², M. Dossanjh^{23,18}, N.P. Dover^{24,22}, S. Eriksson³, O.C. Ettlinger^{24,22}, A. Giaccia^{25,26}, S. Gibson^{15,16}, R. Gray¹¹, S. Green²⁷, T. Greenshaw²⁸, D. Gujral²⁹, H.C. Hall³⁰, E.M. Hammond²⁹, C. Hardiman³¹, E.J. Harris⁴, L. Holland³², A. Howard²⁴, W.G. Jones^{24,30}, K.J. Kirkby^{33,34}, A. Kirkland^{32,35}, A. Knoll³⁶, T. Kokalova¹, D. Kordopati²⁴, T.J. Kuo²⁴, A. Kurup^{22,2}, J.B. Lagrange², H.T. La²⁴, K.R. Long^{24,22,37}, W. Luk³⁸, A.E. MacIntosh-LaRoque²⁴, R. Mamutov^{39,40}, T. Masilela^{41,42}, J. Matheson³⁷, M. Maxouti^{22,37}, J.M. McGarrigle^{24,41}, P. McKenna^{11,43}, R. McLachlan^{31,24}, I. McNeish⁴⁴, M. Merchant³³, Z. Najmudin^{24,22}, S.R. O'Neill¹⁴, U. Oelfke¹, H. Owen¹⁹, C. Palmer¹⁷, J.L. Parsons^{45,46}, J. Pasternak^{22,2}, H. Poptani⁴⁷, J. Pozinski^{24,22,2}, Y. Prezado^{41,42}, P. Price⁴⁴, T. Price¹, K.M. Prise⁴⁸, P.P. Rajeev¹², P. Ratoff^{14,10}, C. Rogers², F. Roman⁴⁹, G. Schettino^{50,51}, W. Shields¹⁵, R.A. Smith²⁴, D. Spiers^{11,43}, R. Taylor²², J. Thomson², S. Towe⁵², P. Weightman²⁸, C.P. Weisitz^{28,10}, C. Wheldon¹, C. Whyte^{11,43}, R. Xiao⁵³

To serve ITRF: 2 + 3-year project
in 6 work packages:

1. Project Management
2. Laser-driven proton and ion source
3. Proton and ion capture
4. Real-time dose-deposition profiling
5. Novel, automated, end-station development
6. Facility design and integration

First two years of
"Five-year plan"
CCAP-TN-10

¹ School of Physics and Astronomy, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK
² ISIS Neutron and Muon Source, STFC Rutherford Appleton Laboratory, Harwell Oxford, Oxon OX11 0QX, UK
³ Department of Physics, Faculty of Science and Engineering, Swansea University, Singleton Park, Swansea, SA2 8PP
⁴ The Institute of Cancer Research, 123 Old Brompton Road, London, SW7 3BP, UK
⁵ Dept of Medical Physics and Biomedical Engineering, University College London, WC1E 6BT, UK
⁶ Maxeler Technologies Limited, 3 Hammersmith Grove, London W6 0ND, UK
⁷ Department of Radiology, Netherlands Cancer Institute-Antoni Van Leeuwenhoek, Amsterdam, The Netherlands
⁸ Faculty of Mechanical Engineering, St. Cyril and Methodius University, Riga, Bozovitski, Straga 1000, Republic of North Macedonia
⁹ Department of Physics and Astronomy, The University of Manchester, Oxford Rd, Manchester, M13 9PL, UK
¹⁰ Cockcroft Institute, Daresbury Laboratory, Sci-Tech Daresbury, Keckwick Ln, Daresbury, Warrington UK
¹¹ Department of Physics, SUPA, University of Strathclyde, John Anderson Building, 107 Rottenrow East, Glasgow G4 0NG, UK
¹² Central Laser Facility, STFC Rutherford Appleton Laboratory, Harwell Oxford, Didcot OX11 0QX, UK
¹³ STFC Daresbury Laboratory, Daresbury, Cheshire, WA4 4AD, UK
¹⁴ Department of Physics, Lancaster University, Bailrigg, Lancaster LA1 4YW, UK
¹⁵ Department of Physics, Royal Holloway University of London, Egham, Surrey, TW20 0EX, UK
¹⁶ John Adams Institute, Department of Physics, Royal Holloway, University of London, Egham, TW20 0EX, UK
¹⁷ School of Mathematics and Physics, Queen's University Belfast, University Road, Belfast, BT7 1NN, Northern Ireland, UK
¹⁸ John Adams Institute, University of Oxford, Keble Rd, Oxford, OX1 3FH
¹⁹ Particle Physics, Denis Wilkinson Building, Keble Rd, Oxford, OX1 3FH
²⁰ Department of Medical Physics, Hampton University Proton Therapy Institute, Hampton, VA 23066
²¹ Hampton University
²² John Adams Institute for Accelerator Science, Imperial College London, London SW7 2AZ, UK
²³ DG Unit, CERN, CH-1211 Geneva 23, Switzerland



UK Research
and Innovation

[Apply for funding](#) [Manage your award](#) [What we offer](#) [News and events](#)

[About UKRI](#) [Our councils](#)



[Home](#) > [What we offer](#) > [Creating world-class research and innovation infrastructure](#)

Creating world-class research and innovation infrastructure

Details and descriptions

Key Information	
1. Name of project (and acronym or short name if relevant)	Ion Therapy Research Facility (ITRF) Preliminary Activity 2
2. (a) Lead contact	Amato Giaccia (amato.giaccia@oncology.ox.ac.uk) Kenneth Long (k.long@imperial.ac.uk)
(b) STFC contact	Massimo Noro (massimo.noro@stfc.ac.uk)
3. Which submission route are you using (Advisory Panel, internal, resubmission) etc.?	Internal
4. One-line description of the Preliminary Activity (22 words)	

The ITRF will be a unique radiobiological research facility exploiting technologies that can transform ion-beam and the treatment of "hard-to-treat" cancer.

Project description

5. Summary of the Preliminary Activity (800 words) – please note this box expands as you type.

Background:

Conventional X-ray therapy (RT) is needed in 40% of cancer cures but some tumours are radioresistant and difficult to treat and cure. In Ion Beam Therapy (IBT), X-rays are replaced by energetic particles such as carbon ions. The physics of IBT allows the dose to be more precisely localised in the tumour and IBT causes significantly more direct, difficult to repair, DNA damage and stimulates a robust immune response. As a result, more tumours will be cured and side effects. However, IBT has yet to reach its full potential.

Globally, there is no facility that can be used to explore the fundamental biological processes underlying which can be used to optimise radiation delivery in time, space, ion species, and energy spectrum, also combination with new drugs. The project proposed here will create a facility to explore advanced radiotherapy, new cancer treatments fit for 2050 and beyond, and make the UK a leader in the global fight against cancer.

Objectives:

The Preliminary Activity (ITRF PA2) proposed here will complete the design and planning of the ITRF construction to create the world-leading, compact, single-site research infrastructure that will deliver the multidisciplinary programme necessary to:

- Elucidate radiobiological mechanisms that underpin the clinical efficacy of particle therapy;
- Generate the accelerator, diagnostic, imaging, and computing technologies required to transform the clinical practice of IBT; and
- Deliver the capability to provide IBT in completely new regimens by combining ion species from protons to carbon exploiting ultra-high dose rates and novel spectral-, spatial- and temporal-fractionation schemes.

The design, specification and planning carried out within ITRF PA2 will build on the complete Conceptual Design Report that is the principal deliverable of the current ITRF Preliminary Activity (ITRF PA1).

The deliverables for ITRF PA2 are:

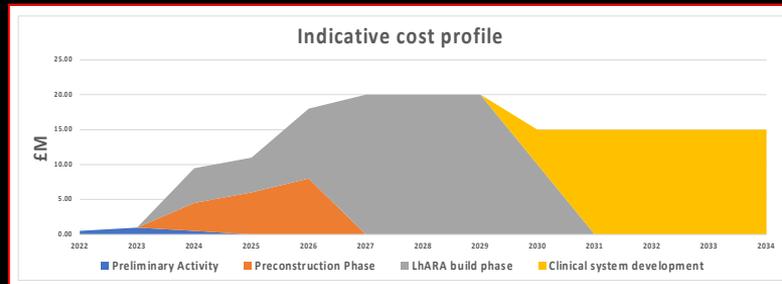
- Technical Design Reports for the staged implementation of the facility;
- A site study leading to site selection and building implementation plan; and
- A proof-of-principle demonstrator system at an existing pulsed-laser facility.

Engagement:

To ensure direct engagement of the target user community, members of the leadership team are drawn equally from the biomedical and natural science communities. On the biomedical side, key leadership positions include LhARA/ITRF collaboration Co-Spokesman, A. Giacca (Director Oxford Institute of Radiation Oncology), Institute Board Co-Chair, Y. Prezado (CNRS Institute Curie), Biological Science Programme Manager, J. Parsons (Birmingham, Vice-Chair of the Association for Radiation Research), and Impact; Clinical and Industrial Programme Manager, P. Price (Imperial, Chair Radiotherapy UK). The biological and medical communities are also strongly represented on the PA1 oversight and advisory bodies.

23. a. Complete the following table for UKRI Infrastructure Fund requirements, noting that costs are only approximations at this stage.

Infrastructure Fund requirement (£m) Point estimates.	Year												Total
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	
Project costs	22	50	81	50	22								225
TOTAL	22	50	81	50	22								225



Visions Panel feedback

...

Proposal Feedback: Ion Therapy Research Facility (ITRF)

The Visions Panel found the ITRF proposal to provide evidence of the project's potential to deliver of a step-change in capability and understood that such a facility would allow experimentation that does not currently exist elsewhere.

In terms of strategic drivers and the timeliness of the proposal within the current strategic landscape, the panel considered the proposal to be **timely but felt that the proposal may benefit from clarifying the existing level of community support for the proposal**. It was also noted that as the collaboration involved in the proposal is wide-reaching **the proposal may benefit from including further information on the level of engagement from all members of the collaboration**.

Please let us know if you have any queries.

Kind regards,
STFC Visions Team

... also request to revise the "total infrastructure cost".

SB/EB feedback on PA2 proposal to STFC Visions Team



UKRI Infrastructure Fund: Wave 4 Preliminary Activities

The STFC prioritisation process for Wave 4 preliminary activities of the UKRI Infrastructure Fund began in early 2023 with an invitation to the PPAN Advisory Panels and internal STFC departments to identify and submit proposals for consideration.

STFC received thirteen Preliminary Activity proposal submissions, seven of which were resubmissions from previous waves of the STFC prioritisation process. Initial feedback from the STFC Visions Panel was provided for all proposals in August, focusing on the potential for delivery of a step change in capability and the strategic drivers of the projects.

Following incorporation of feedback, the proposals were assessed by both STFC Science Boards, PPAN and Facilities & Laboratories, and resulting recommendations were provided to STFC Council for consideration alongside the proposals. STFC Executive Board then considered all advice to agree the final outcomes of the prioritisation process.

Unfortunately, the ITRF Preliminary Activity proposal was not selected by STFC for submission to Wave 4 of the UKRI Infrastructure Fund. More detailed proposal feedback focused solely on the outcome of the prioritisation process is provided below.

ITRF: Ion Therapy Research Facility - Preliminary Activity 2

The ITRF proposal illustrated the high impact potential of the project, and it was recognised that the full infrastructure could deliver a large step change in capability for the UK. The proposal was considered ambitious and a good fit to the Infrastructure Fund. However, the project fit within the international landscape was unclear and the proposal would have benefitted from focusing on the specific strategic drivers of the project.

The proposal clearly displayed the project's potential for broad reach beyond one discipline, but the level of engagement of potential partners for the preliminary activity and the potential target community for the full infrastructure were unclear from the proposal.

Although the proposal was ambitious, it was considered to be lacking in evidence and clarity across a few areas; the progress of the first preliminary activity could have been more prominent, the physics case for progressing the project made clearer, and the feasibility of the proposal more clearly justified. It was noted that the proposal would have benefitted from providing information on the proposed approach to achieving the listed deliverables.

Overall, the proposal was not considered suitable for submission to Wave 4 of the UKRI Infrastructure Fund, but discussions are ongoing within STFC and in co-ordination with the ITRF team.

- **Broad support**
 - High impact potential
 - Could deliver step change
 - Potential for broad reach
 - Ambitious
- **But not selected**
 - Fit with international landscape unclear
 - Potential for target community unclear
 - Progress of first preliminary activity unclear (but only 9 months into 2 year project when written)
- **Now seeking access to bridging funds**

Structuring the bridging activity

Define bridging programme to optimise delivery of:

- **Biology/proof-of-principle programme**
- **R&D programme to address key project risks**
- **Strategic partnerships**

Radiobiological experimentation and modelling	WP A	WP A.7 - Radiobiology Experiment
		WP A.4 - Ion acoustic dose measurement
		WP A.5 - End station and novel diagnostics
		WP A.2 - Source for Radiobiology Expt
ITRF/LhARA R&D	WP B	WP B.6 - FFA feasibility study
		WP B.2 - Source
		WP B.3 - Capture
PM	WP C	WP C.1 - Proj Man
		WP C.8- Outreach & Engagement

Development of radiation biology programme:

– At existing facilities:

- Novel (e.g. laser driven)
- Conventional

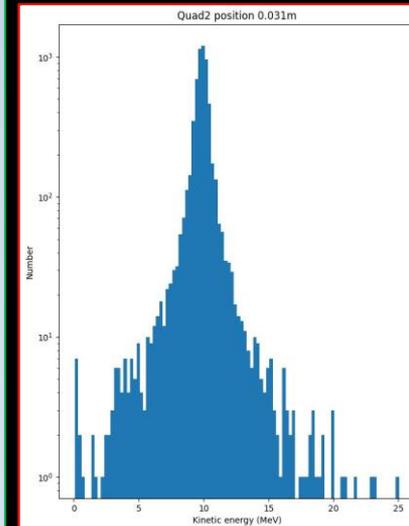
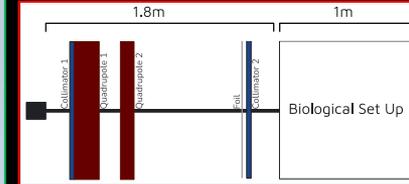
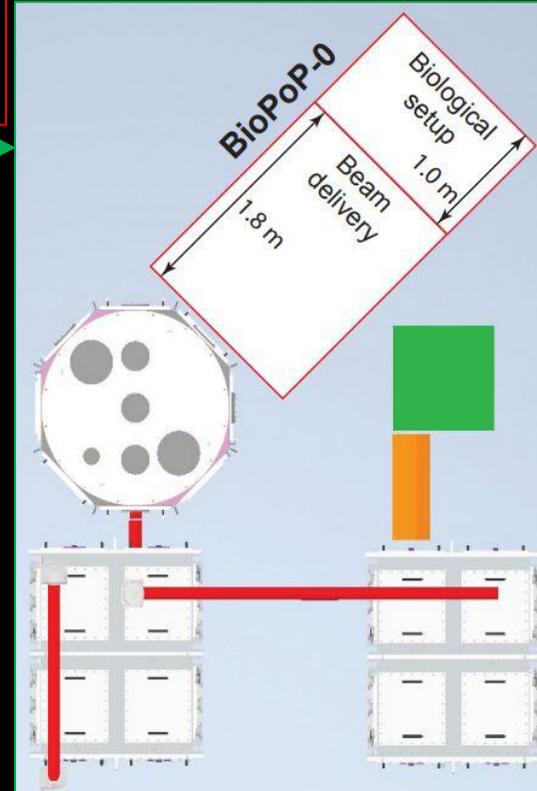
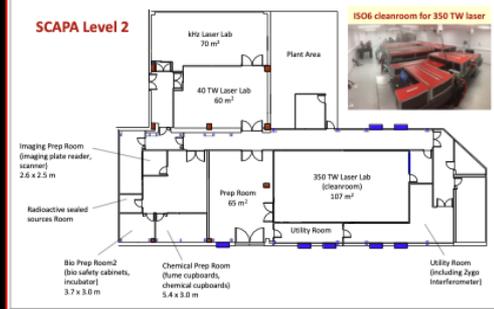
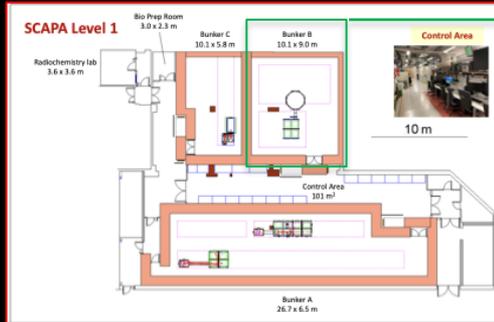
LhARA proof-of-principle experiment:

- CW: “... include as many of key LhARA elements as possible ...”

Biological measurement programme & proof-of-principle experiment

“WP7”, led by J. Parsons

Increasingly important aspect of the programme going forward



About actions

Doctoral Networks

Postdoctoral Fellowships

Staff Exchanges

COFUND

MSCA & Citizens

How to apply

Doctoral Networks

This page explains the purpose of the Doctoral Networks action and who can apply for it. The information provided below is a summary of the main rules and requirements.



Doctoral Networks call schedule

- The 2023 call for Doctoral Networks is now **closed**.
- The next call will open in **2024**.

[Call for MSCA Doctoral Networks 2023](#) →

EU actions

Start preparation today!

European Innovation Council

EIC Pathfinder

What for

Deep tech projects

Taking forward breakthrough deep tech projects with a high degree of scientific and technological ambition and risk (TRL 1-4)

Who can apply

Research teams

Consortia of different independent legal entities established in different countries or single applicants (Pathfinder Challenges only)

What you get

Grants and investments

Grants of up to EUR 3 million (Pathfinder open) or EUR 4 million (Pathfinder Challenges), coaching & mentoring, networking.

CNRS/Imperial IRC & CNRS/STFC

CNRS/Imperial IRC:

- FONS/FOM @ Imperial
- Biologie, IN2P3, ... @ CNRS
- LhARA central to “Health” pilar

CNRS/STFC meeting March '24

- Identified various avenues for collaboration:
 - ITRF/LhARA is one
- Contact:
 - Kevin Cassou, IJCLab
- Joined up CNRS/ICL/STFC



Lets start the meeting ...

- **Today/tomorrow:**
 - Review progress ... substantial
 - Agree steps to complete 18-month report, milestone reports ...
 - Continue discussion of bridging period
 - Initiate discussion of MCSA network
 - Pathfinder next
- **Exciting!**