

Review of LhARA collaboration's R&D proposal
for the Preliminary and pre-construction phases
27th October 2022 16.30-18.30 BST

Accelerators and technology session:

Schedule

16.30 - 16.45	Project Management (WP1)
16.45 – 17.20	Laser-driven proton and ion source (WP2)
17.20 – 17.5	Proton and ion capture (WP3)
17.55 -18.30	Transfer lines and post accelerator (WP6)

Project Management

Talk 1: Overview – Colin Whyte (Strathclyde)

- Required resources (material and personnel)
- Available resources (material and resources)
- Why not starting with solenoids?
- Risk mitigation strategy, alternatives, and fallbacks

Laser-driven proton and ion source (WP2)

Talk 1: Overview and management – Elisabetta Boella (Lancaster/CI)

- Description of the source and interfaces
- Suggested laser system specifications
- Early and Ultimate beam parameters at the exit of the source (see earlier lists for reference)
- Milestones and Timeline for the design, R&D
- Required resources (material and personnel)
- Available resources (material and resources)

Talk 2: Risk management – Nicholas Dover (Imperial/JAI)

- Technical risks (e.g. poor reliability, reproducibility) and mitigations (hardware? Modelling, feedforward,)
- Other risks and proposed mitigations

Talk 3: Diagnostics, instrumentation and targetry – Ross Gray (Strathclyde/CI)

- Instrumentation and any special development for source characterization and operation
- Ion/proton selection and switching (include realistic assessment of ease with which ion species can be changed during operation)
- Targetry (range of potential rep-rated target development for ~ 10 Hz operation)
- R&D plans and milestones (how to get beyond 1 Hz?)
- Reproducibility and reliability considerations
- Other back-up plans?

Proton and ion capture (WP3)

Talk 1: Gabor lens Christopher Baker (Swansea):

- Description of the capture system and interfaces (include collimation, momentum selection and radiation protection considerations? Here or in WP6)

- Why a Gabor lens?
- State of the art and required parameters (early and ultimate)
- R&D plans to achieve required parameters (early and ultimate). Is the test in Swansea sufficient to assess the feasibility of the final design?
- Technical Risks (plasma stability, high voltages, plasma filling factor, radius,...) and mitigations
- Required resources (material and personnel)
- Available resources (material and resources)
- Other risks and proposed mitigations
- Milestones and Timeline for the design, R&D: is there a decision point when to select among the two options?

Backup solutions

- State of the art and required parameters (early and ultimate)
- Design and R&D plans?
- Technical Risks (reduced performance?) and mitigations
- Other back-up plans (hybrid solutions mixing Gabor lens and solenoids?)?

Transfer lines and post accelerator (WP6)

Talk 1: Stage 1 and Stage 2 vision: Jaroslaw Pasternak (Imperial/JAI/ISIS)

- Expected early and ultimate:
- Input beam parameters from capture section
- Output beam parameters from the capture section
- Input beam parameters at the post accelerator
- Output beam parameters at the post accelerator
- Parameters at the radiobiology stations (Stage 1 and 2)
- Beam lines (2 in vitro and 1 in vivo)
- Main parameters
- Acceptance
- Description of the capture system and interfaces (include collimation and momentum selection)
- Collimation, momentum selection and radiation protection considerations
- Beam diagnostics/instrumentation
- Requirements for beam operation and characterization
- Description and main machine/system parameters
- Why an FFA?
- Alternative solutions (linacs, Rapid Cycling Synchrotrons,...)
- Beam diagnostics
- Identify notable areas for possible industrial collaborative R&D and other outreach
- Injection and Extraction sections
- Milestones and Timeline for the design, R&D: is there a decision point when to select among options (if any alternative option is worth pursuing)?
- Required beam diagnostics and special instrumentation in (and at end of) capture section (here or in WP6 presentation(s) (use of SciWire and SmartPhantom ?)
- Machine learning role(s)

Talk 3: General facility infrastructure and integration (WP6): Neil Bliss (STFC TD Daresbury)

- Stage 1 and Stage 2 vision
- General radiation protection considerations
- Power consumption and operation (skill required, maintenance and operation costs, reliability considerations, too early?)
- Milestones and Timeline for the design

- Required resources (material and personnel)
- Available resources (material and resources)
- Project scientific, technical, schedule, and financial risks attendant and the degree to which they are addressed in proposed activity
- Other risks and proposed mitigations