HITRI plus
Heavy Ion Therapy Research Integration

Workpackage 7, Task 7.3

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SEEIIST HITRI+ KICK-OFF MEETING JUNE 2, 2021

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101008548

Introduction

- Partners: SEEIIST, CERN, CNAO, MedAustron
- Task leader: M. Sapinski (SEEIIST)
- Three sub-tasks:
  - 7.3.1: Operational modes: identification of specific requirements and challenges in operation due to switching between therapy and research operational modes.
  - 7.3.2: Beam transport lines: definition and improved layouts of the transport lines to the experimental and clinical areas, with special attention to safety due to switching between 2 modes, eg. beam dump, shielding.
  - 7.3.3: Beam instrumentation and QA: identification of advanced beam instrumentation options and of their possible application to present and future medical synchrotrons.

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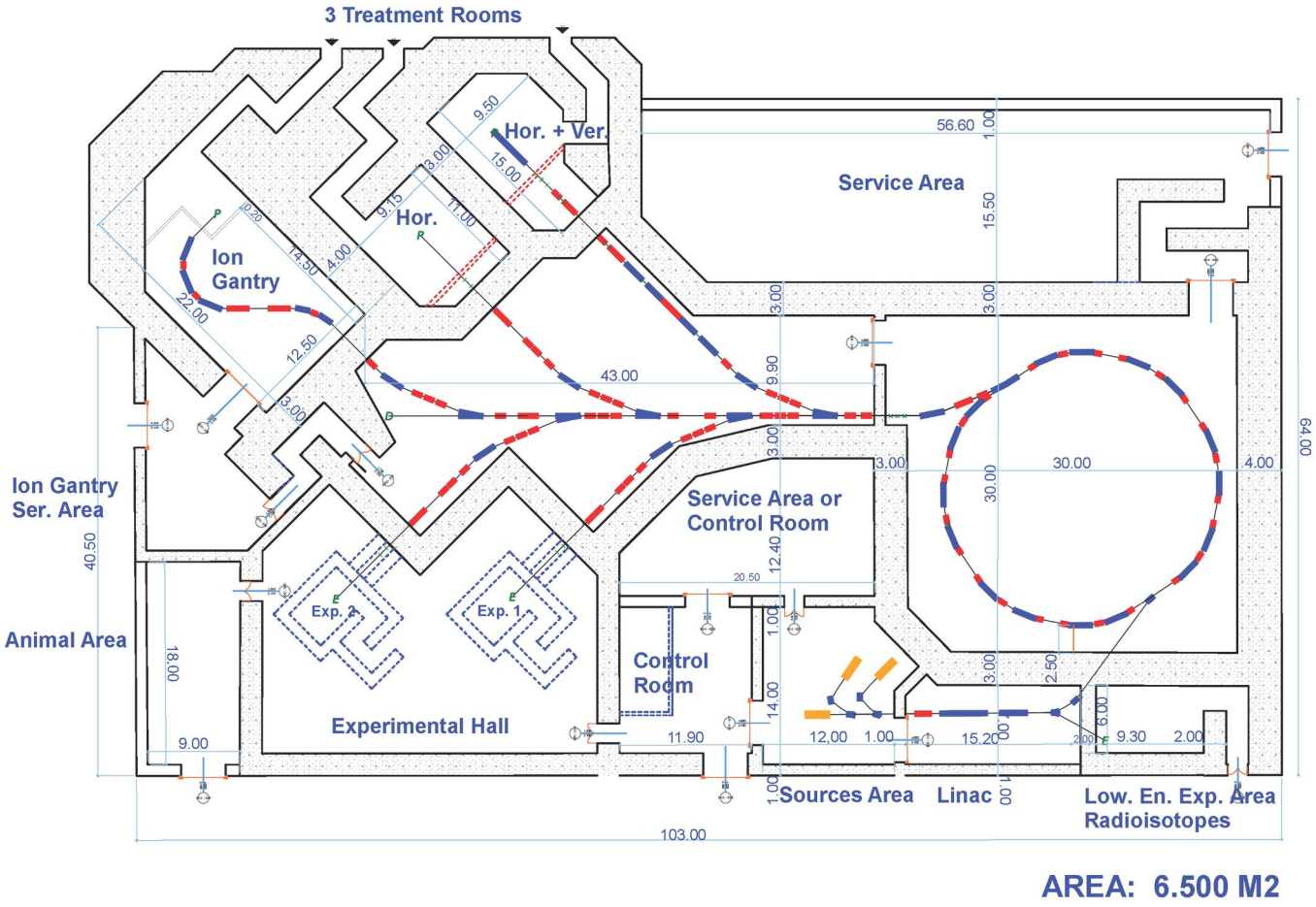
SEEIIST particularities

- Beam intensity from the source: 600 μA of $^{12}C^{4+}$ (3x more than current facilities)
- Beam intensity in synchrotron: $2 \cdot 10^{10}$ of $^{12}C^{4+}$ (20x more than current facilities)
- Multi-Energy Extraction based on RF-KO slow extraction method, spill duration: 200 ms - 10 s
- FLASH: Fast extraction and/or fast-slow-extraction:
  - Spill duration: 0.2 μs – 50 ms
  - Need instrumentation able to cover $5 \cdot 10^7$ of dynamic range!



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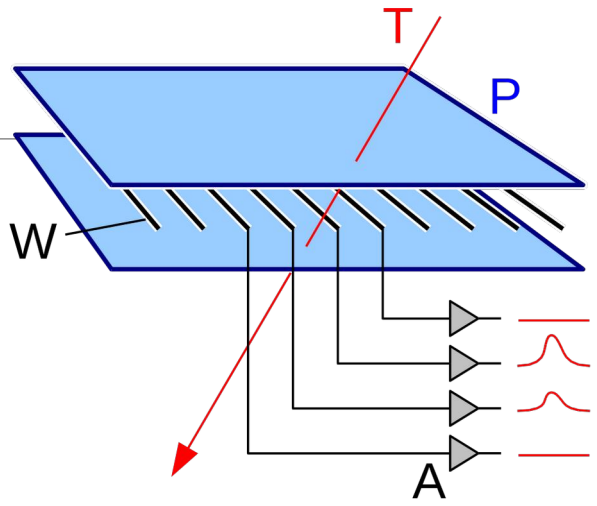
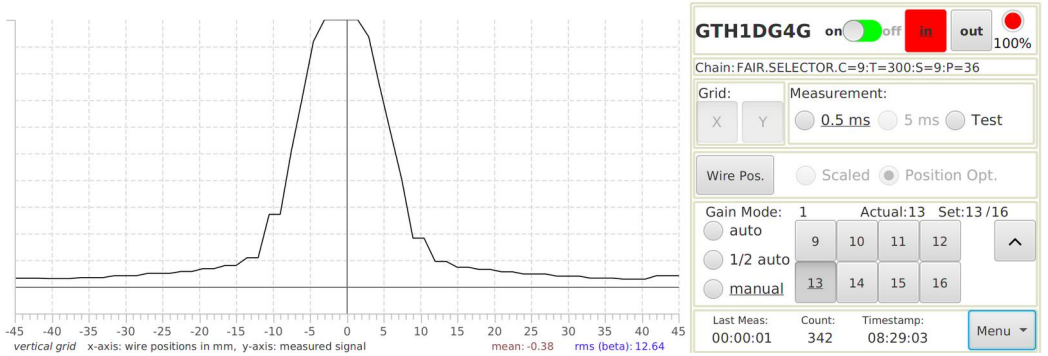
Example:

- Multi-Wire proportional chambers (MWPC) are widely used to measure the extracted beams;
- At high beam currents the chambers saturate.
- Questions:
  - What beam size/position measurement technology should be used to capture beam intensities with dynamic range of ~10^8 ?
  - Where should these detectors be placed to get optimal measurements?
  - How should they be used in different modes of operations?





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Synergies with other tasks, deliverables:

- Connection to task 7.2, especially 7.2.3 (extraction and beam transport)
- Connection to WP11 (Controls and safety)

Deliverable (D3.3):

Report on operational modes, beam transport and instrumentation (M36), March 31, 2024

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Thank you for your attention!

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