

Abstract

The Ion Test Bench of ISOLDE Superconducting Recoil Separator (ISRS) project aims to integrate the CCT magnet units (MAGDEM) in a testing environment at ISOLDE provided of the necessary subsystems and diagnosis equipments to validate the studied functionalities of the units for different types of experiments and reactions [1]. One of the mains characteristic of this bench, is the angled trajectory produced by the MAGDEM unit, and a rotatable reaction chamber to allow for studies of specific angled components of the reactions.

Objectives

- Design and construct according to beam dynamic specifications.
- Design a rotatable Reaction Chamber.
- Design a rotatable Tench Bench around the Reaction Chamber's center.
- Integration of the hardware and software, providing a final control interface of the bench.

Methodology and Specifications

- Mechanical Design Constraints: Usable area in ISOLDE TX3 is limited and thus bench footprint and its rotation must be within limits of the usable space.
- Rotation Reaction Chamber: Show allow to rotate from the reaction chamber output the test bench to a range of $\pm 45^\circ$ respect of the reaction chamber center.
- Bench Rotation: Precise and servo-ed system to allow bench repositioning to a new angle configuration.

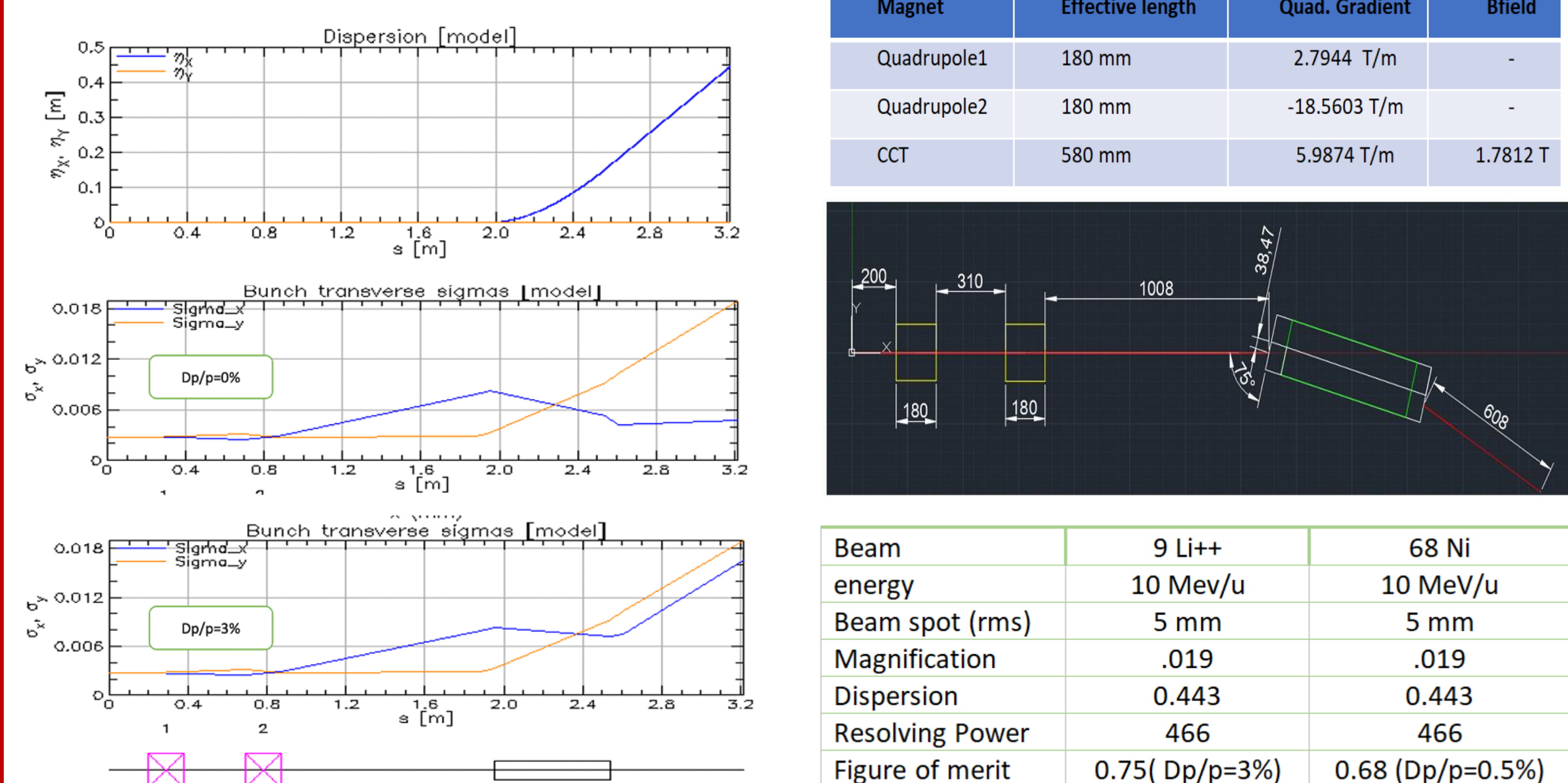


Fig 1. Beam Dynamics calculations by Fazel Taft, University of Valencia

Conceptual Framework

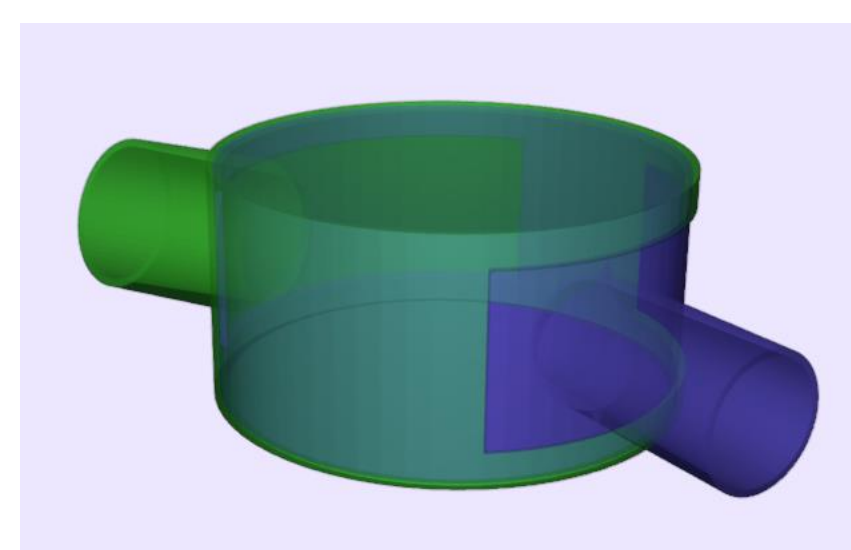


Fig. 2 Cylindrical Reaction Chamber

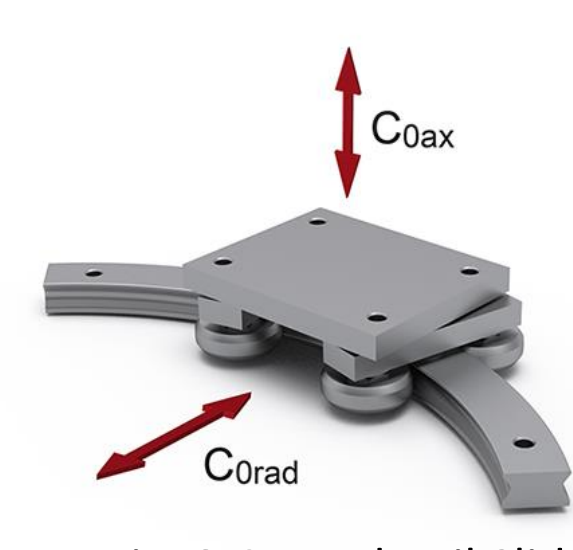


Fig. 3 Curved Rail Slider

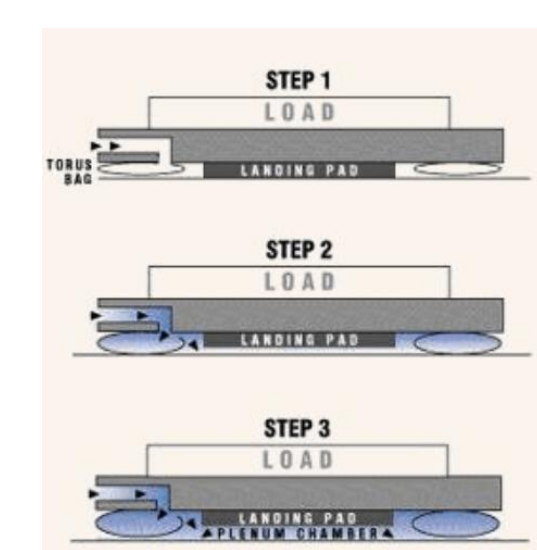


Fig. 4 Air Casters

- Pros and cons of two options of rotatable reaction chambers were considered: spherical and cylindrical (Fig 2).
- Two bench rotation principles were weighted: curved rail slider (Fig. 3) and air casters (Fig 4).
- Different options to place sensors and targets inside reaction chamber were weighted.

Results

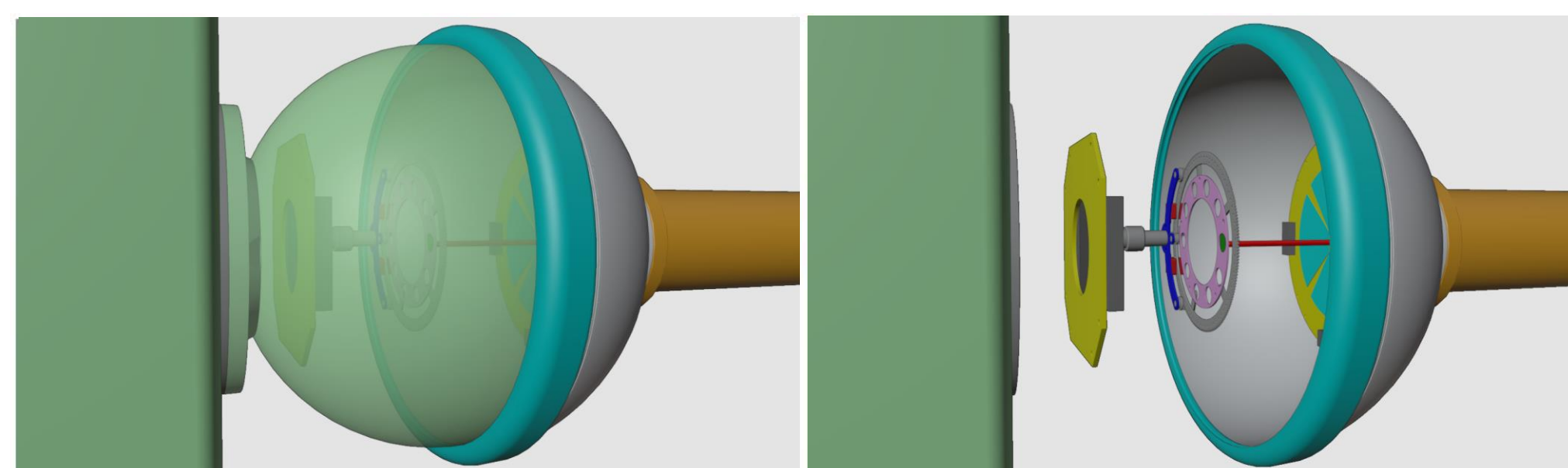


Fig. 5: Rotable Reaction Chamber closed (left) and open (right).

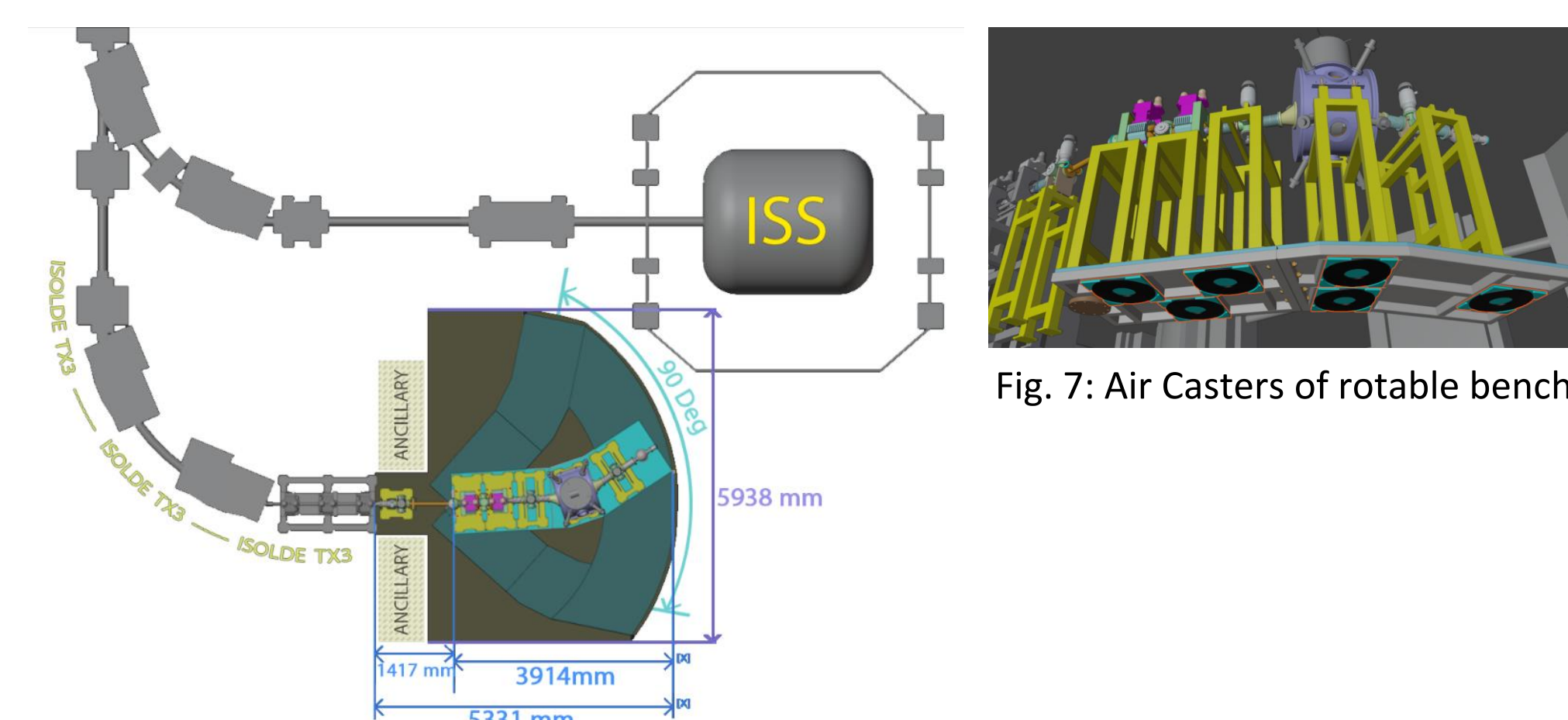


Fig. 6: Footprint of the Ion Test Bench at ISOLDE TX3.

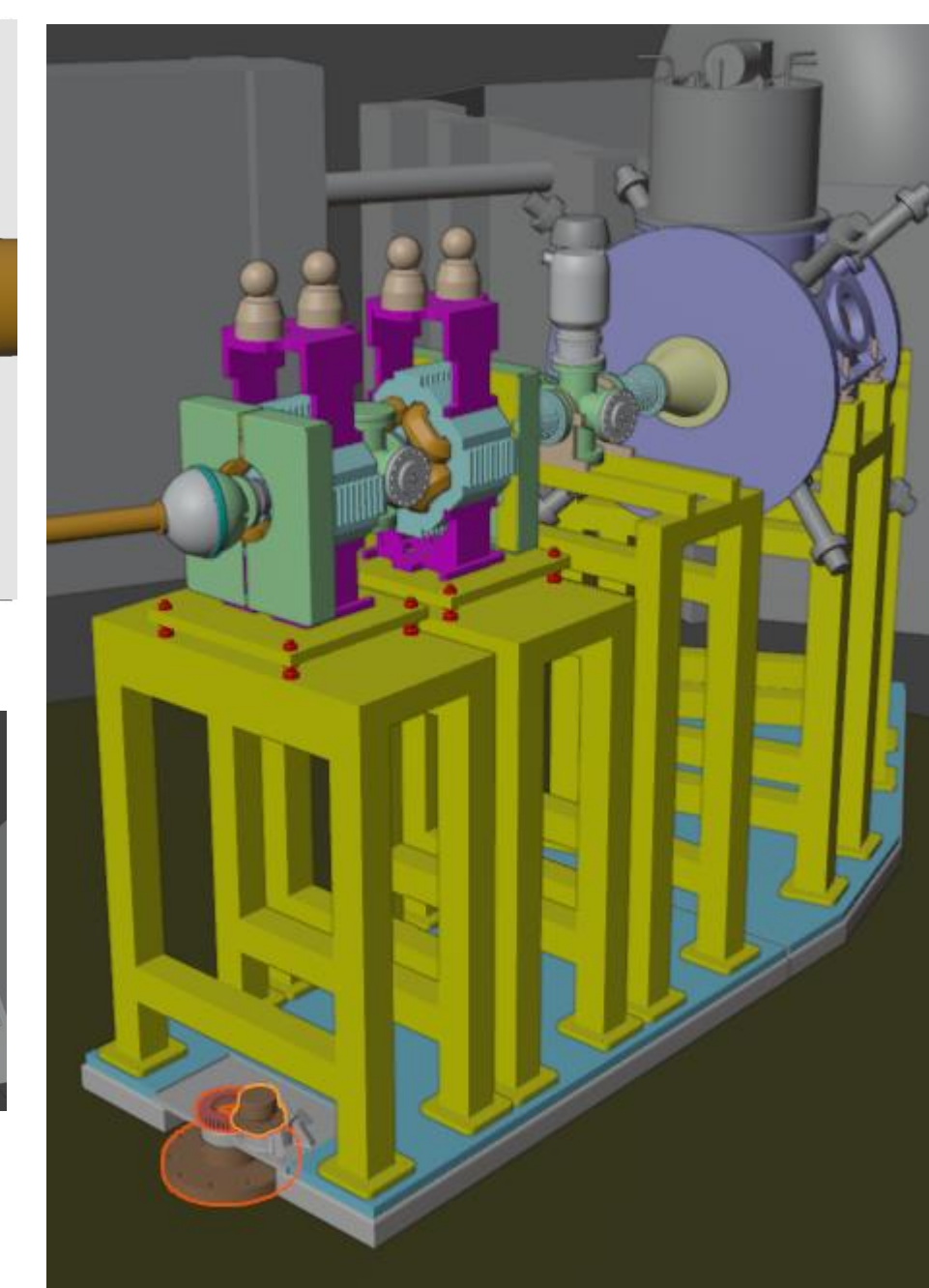
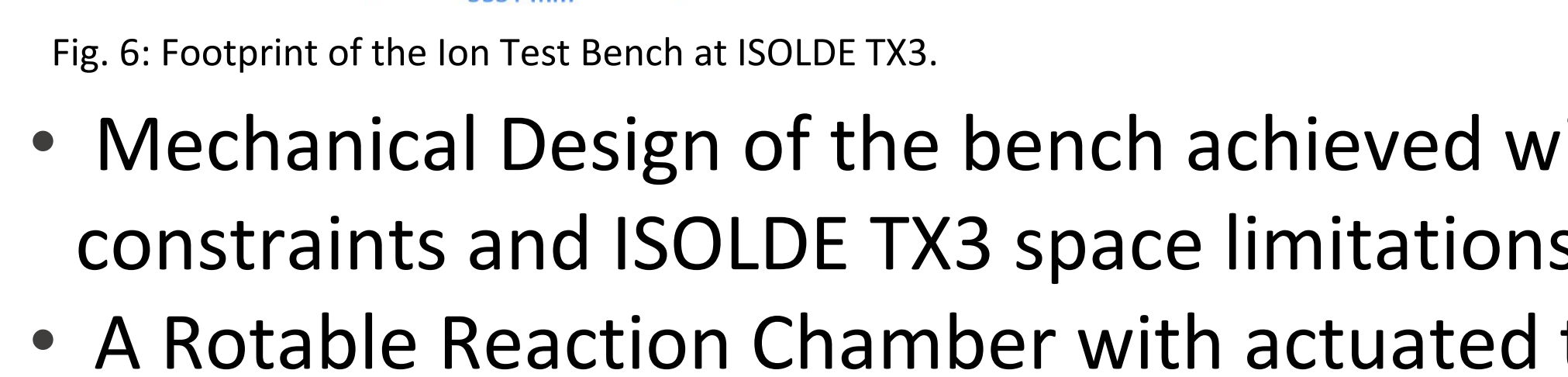
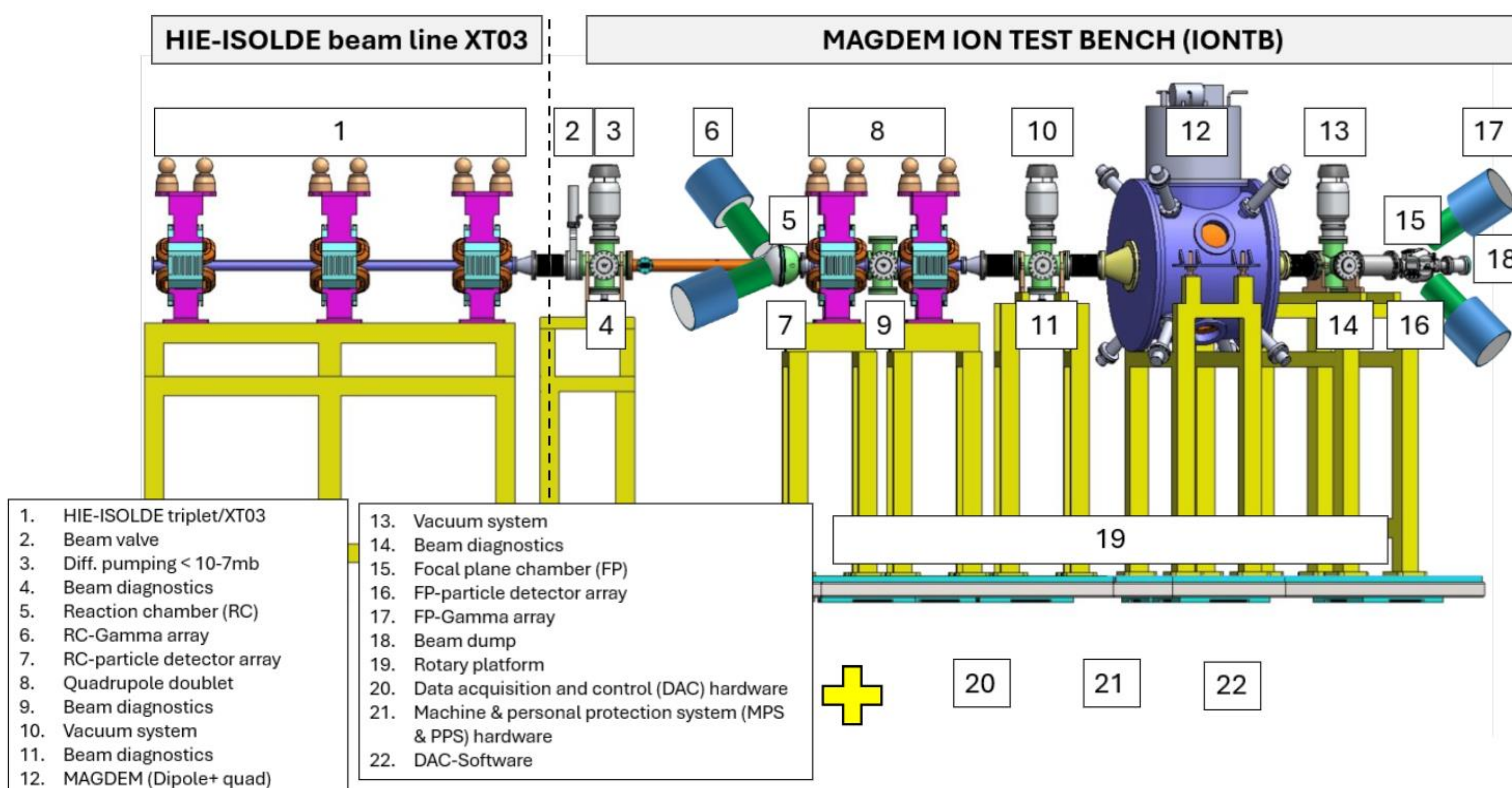


Fig. 7: Air Casters of rotatable bench.



- Mechanical Design of the bench achieved within beam dynamic constraints and ISOLDE TX3 space limitations (Fig.1).
- A Rotable Reaction Chamber with actuated target holder was designed and prototype production undergoing (Fig.2).
- The Bench was designed to rotate around reaction chamber's center by using air casters and servo motor (Fig 3).

Future Prospects



- More Diagnosis equipment to be added in T-cross and 6-cross components.
- Next development will be in calibration aiding mechanisms.
- A enhanced version could allow camera to be rotated with vacuum.
- Some sort of development should allow for expected outcomes of the reactions happening for different bench angles and targets of the experiments.

References

- [1] I. Martel et al, Letter of Intent "Design study of a Superconducting Recoil Separator for HIE-ISOLDE", INTC-I-228, 2021.
- [2] ISRS project web site, www.uhu.es/isrs/