EUROPEAN UNION
European Structural and Investment Funds
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MINISTRY OF EDUCATION,
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MARGE – New **M**odul**A**r **R**obotic **G**as-Jet Targ**E**t System for the chemistry of SHE homologues studies

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Outline

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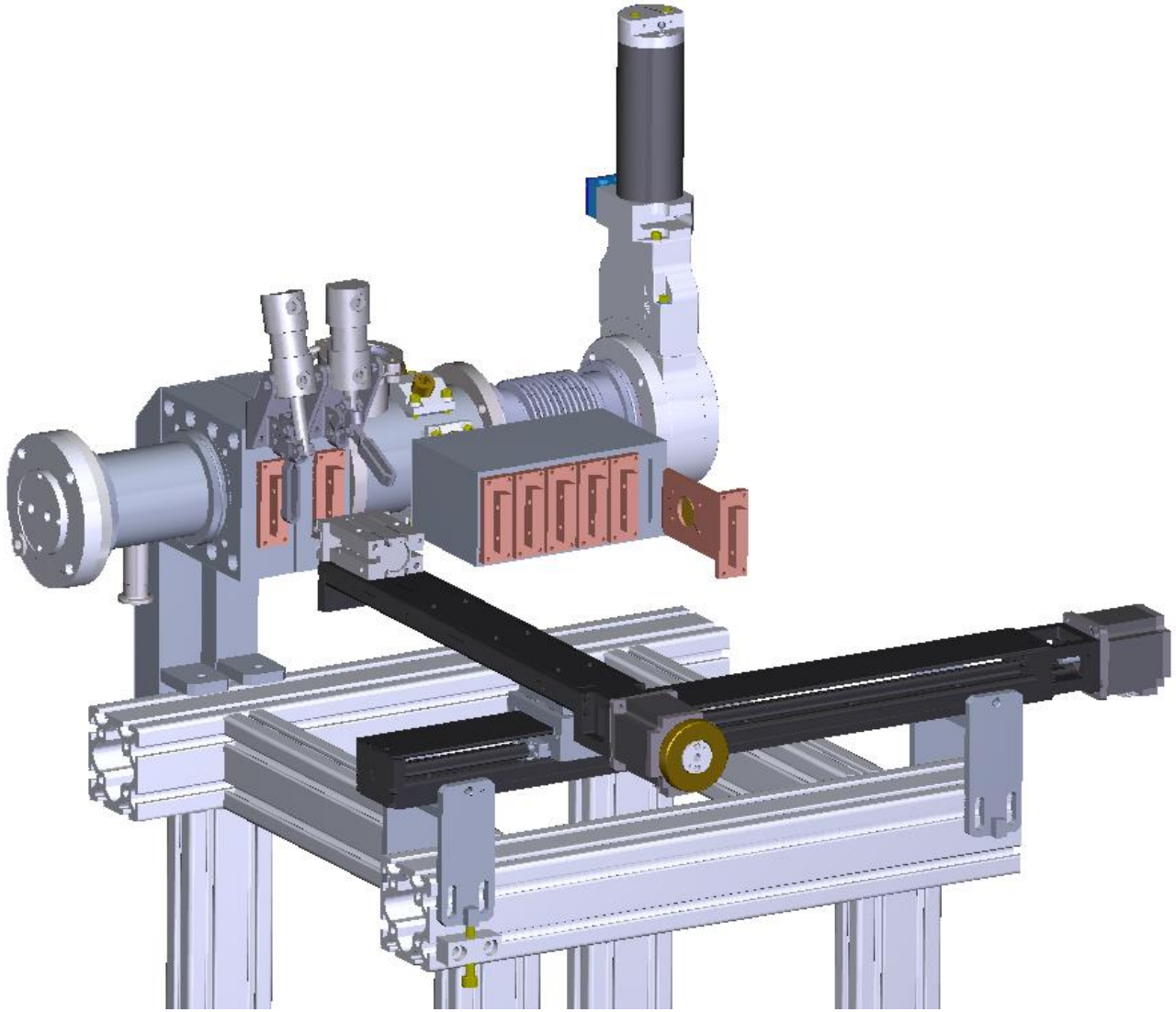
2. Modules description
3. Photo and video illustration
4. Pros and cons
5. Conclusion



Motivation

- It was necessary to physically go inside cyclotron vault to switch targets before MARGE. That came with increased radiation exposure and a necessary cool-down period. Remote target switching provides
  - Increased radiation protection.
  - Time and money savings.
- We wanted to create a modular versatile system. Especially the idea of having a series of target chambers in beam at the same time became very interesting.
- To make operators' lives easier and improve the beam diagnostics and focusing.

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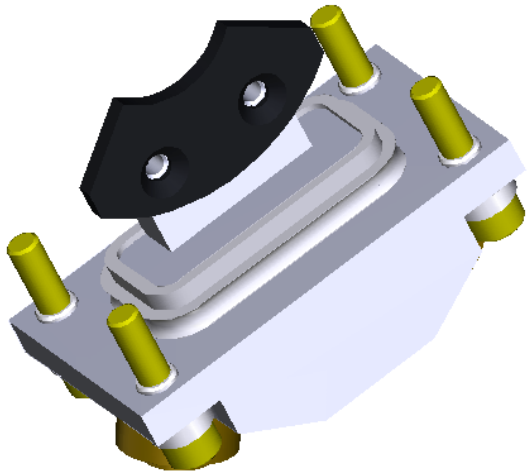
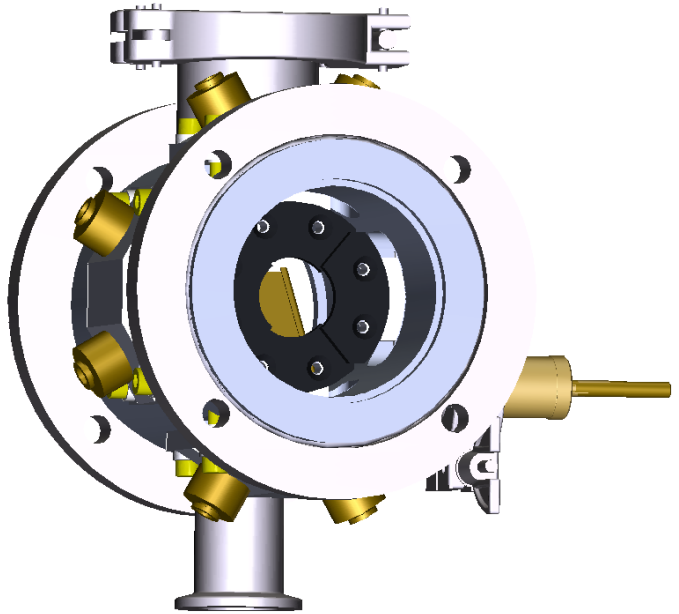
Modules – 4-pole collimator

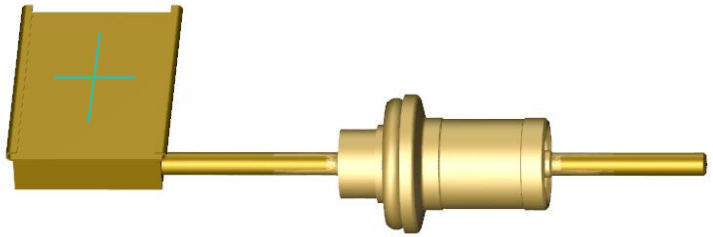
- Position specific solution – tells in which direction is the beam diverted
- Provides constant on-line information about the beam axial position
- 4 independent carbon electrodes – easily replaceable

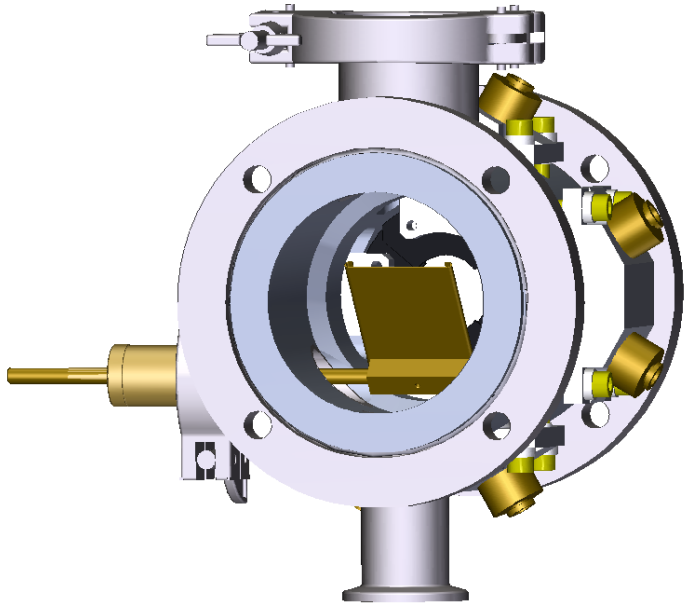




Modules – Beam monitor

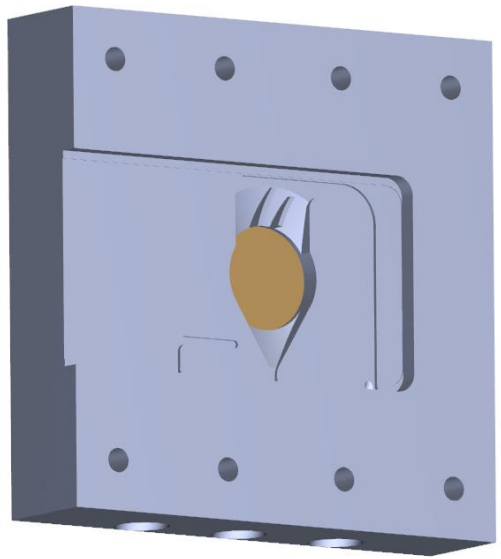
- Provides optical beam image – camera pointed towards the upper glass window
- Used usually for pre-campaign beam focusing
- Willemite used as a fluorescent screen material

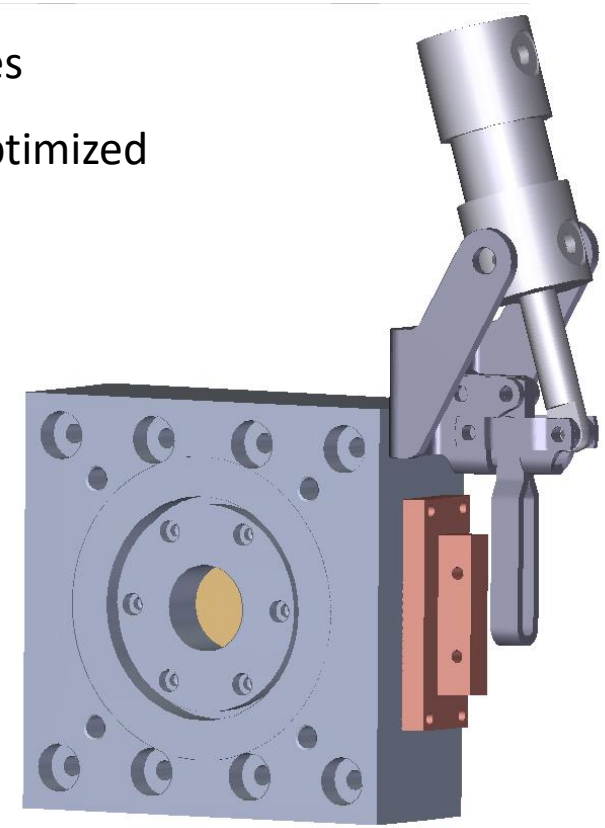




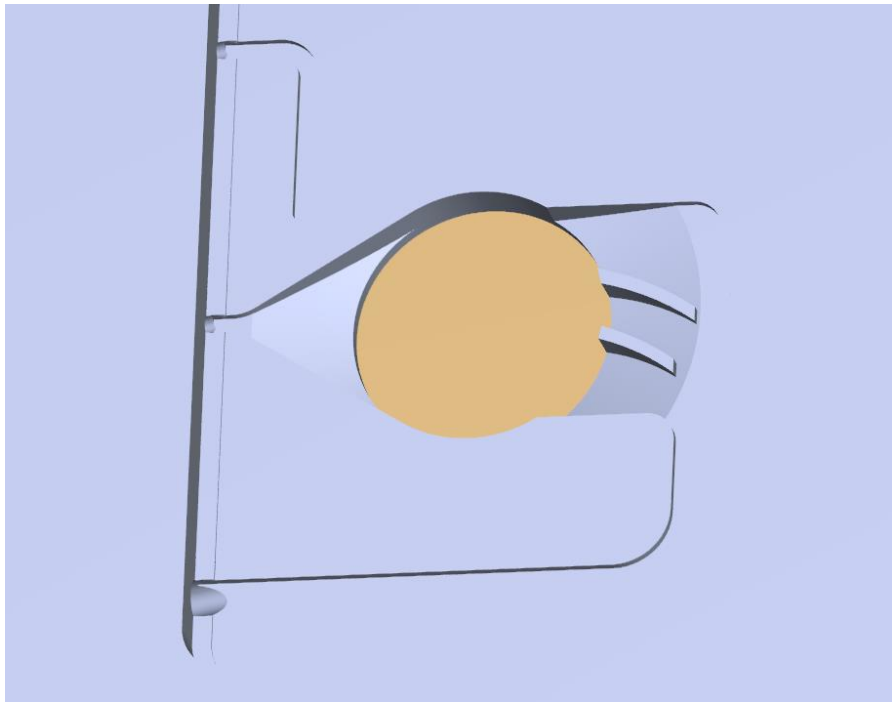
Modules – Gas-jet transfer chamber

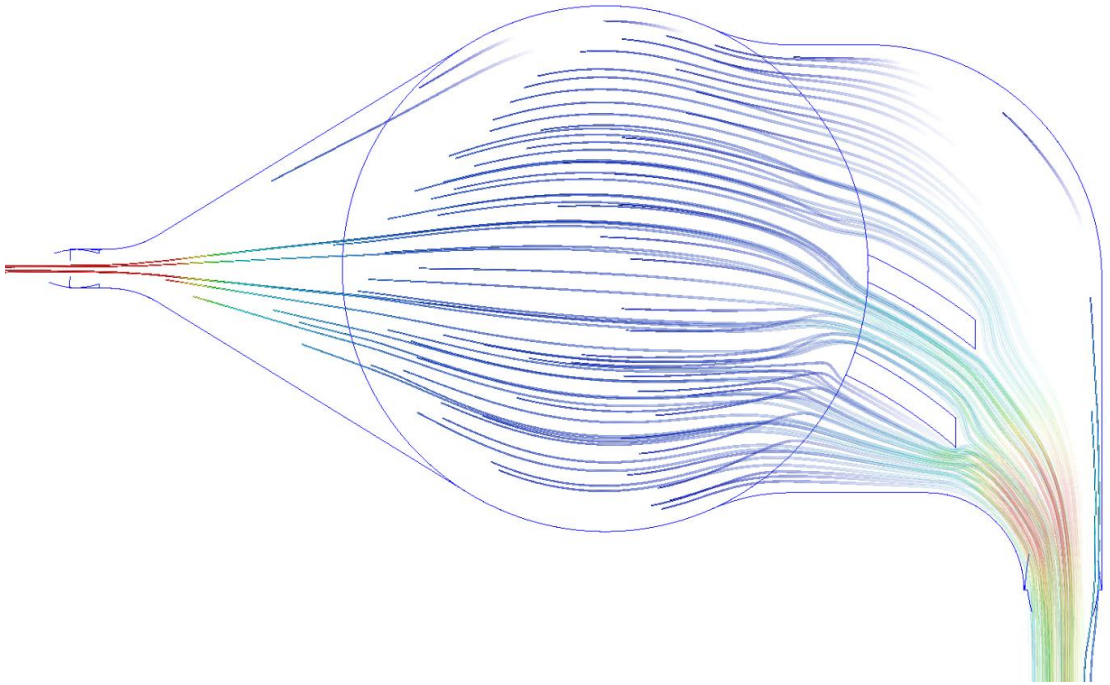
- Modularity allows for future expansion to more chambers in series
- Provides even flow distribution across the target surface – CFD optimized





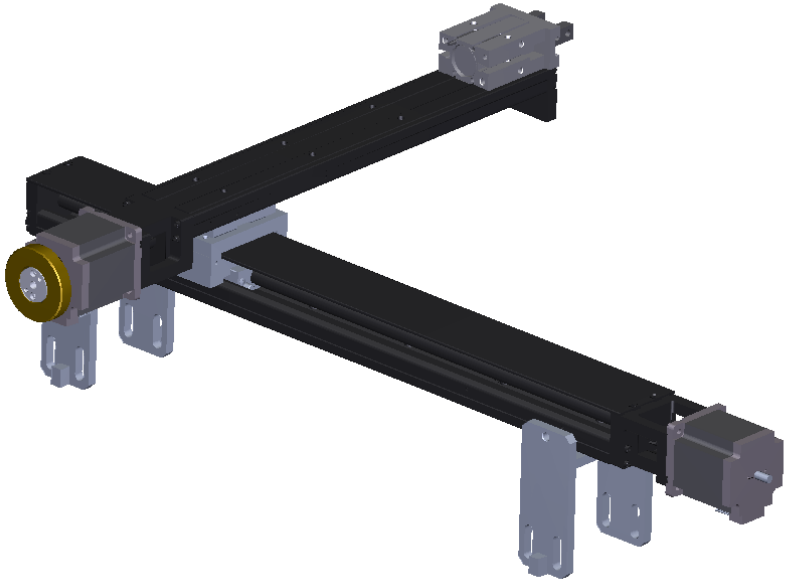
Modules – Gas-jet transfer chamber





Modules – Target manipulator and storage

- Precise XY target manipulator set with two Nanotec stepper motors
- Restricted to perform only pre-programmed routines
- Storage is modular and expandable (6 slots currently)



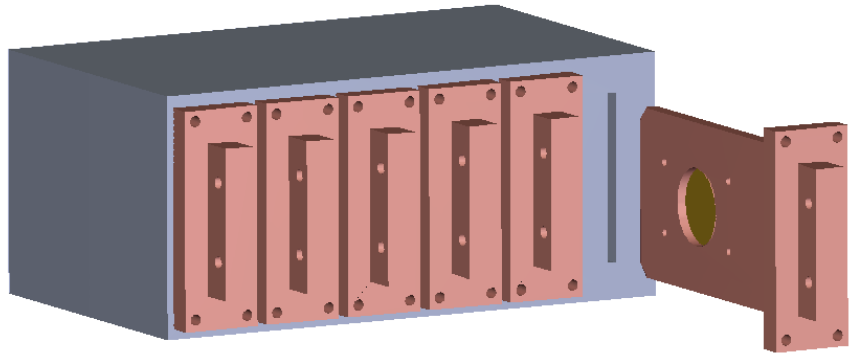
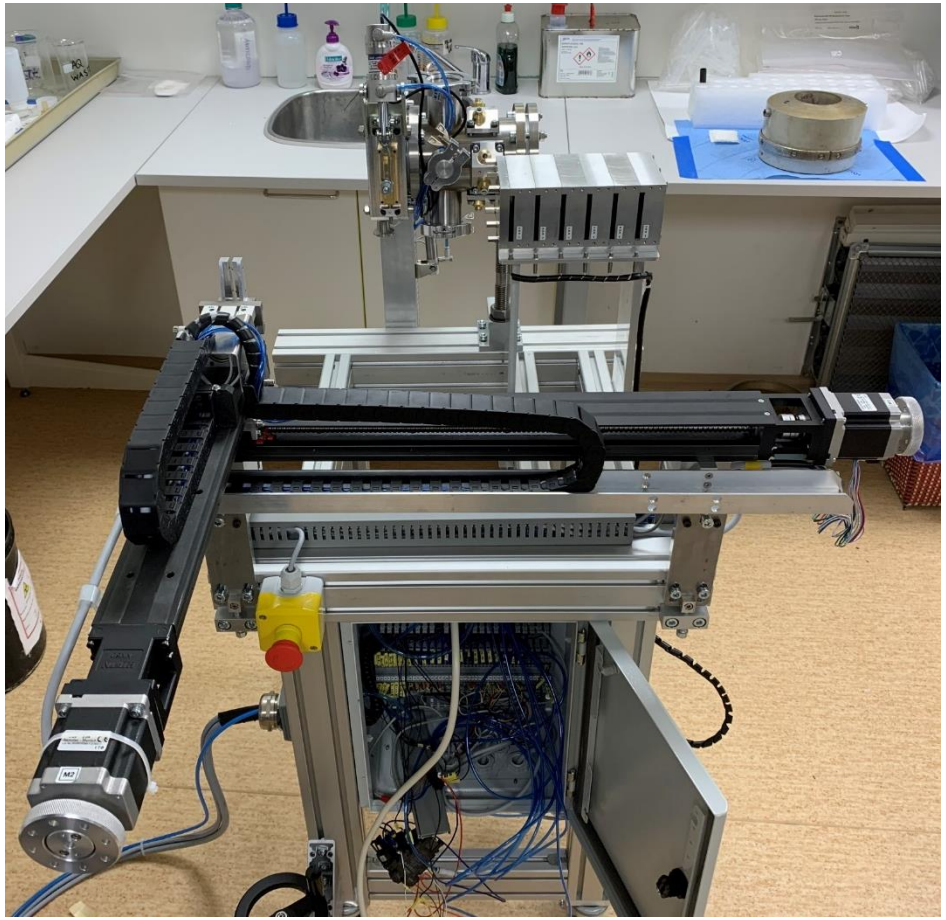
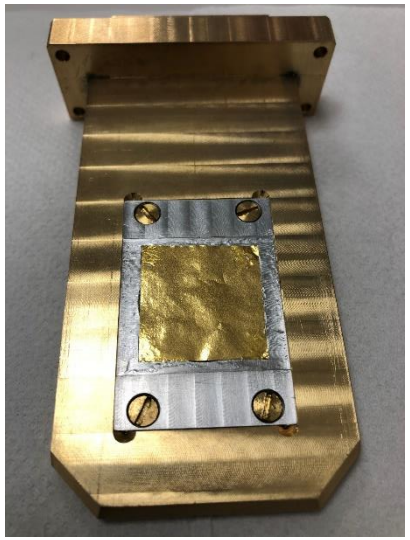
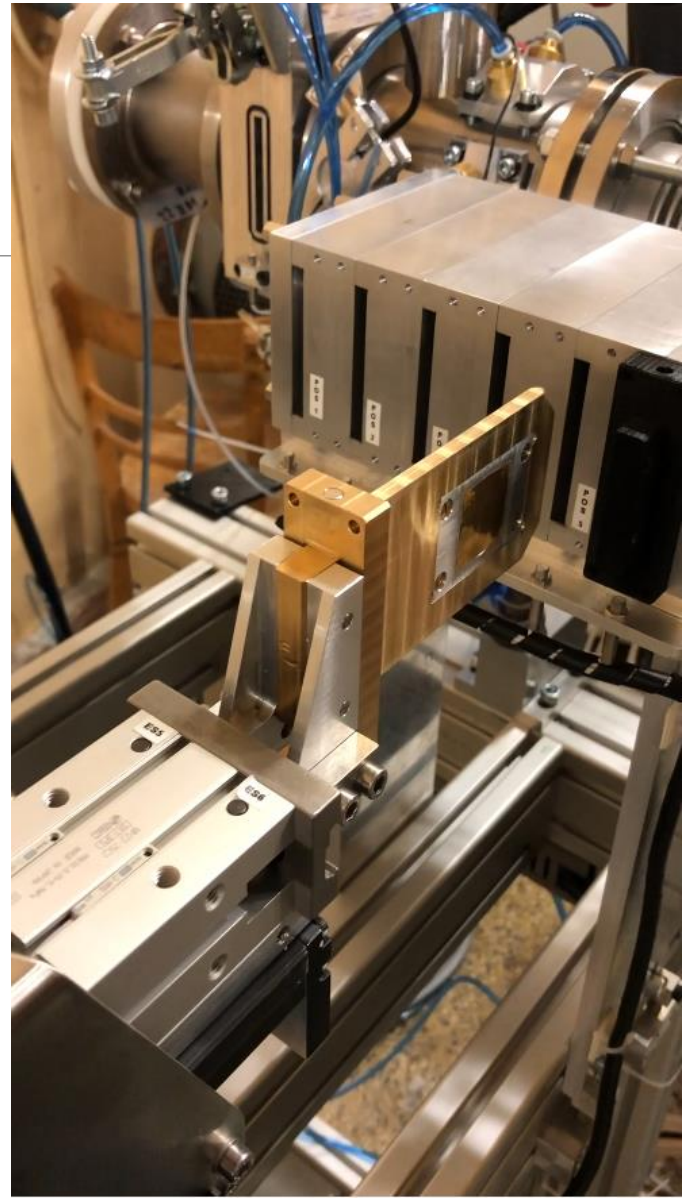


Photo and video illustration

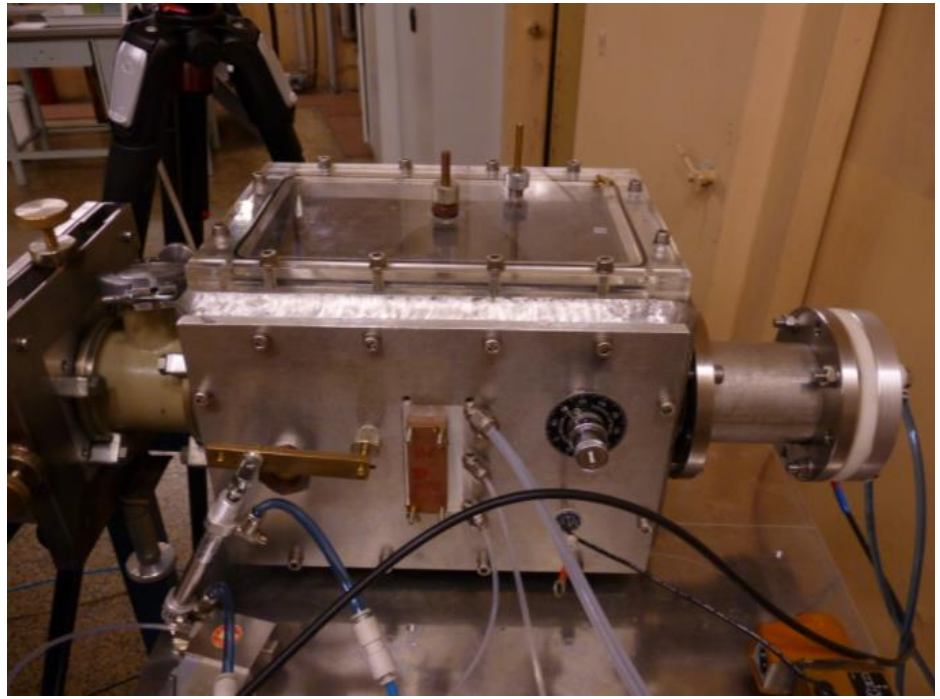






Pros & cons

- PROS:
  - Increased radiation protection of personnel
  - More efficient beam time – less cooling periods
  - Modularity and expandability
  - Better on-line beam diagnostics
  - More targets possible in beam at the same time
- CONS:
  - Compactness and mobility
  - Higher risk of malfunction



Conclusion

- MARGE system was successfully mounted and tested at U-120M cyclotron in Řež near Prague on April 2021
- Beam tuning and focusing was fast and without any drawbacks
- Target manipulator showed no hardware or software issues when in operation
- Cyclotron-produced Tl was successfully prepared and transported to the lab for chemistry experiments using MARGE system

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RadChem 2022 will cover most topics of the former meetings of this series. Papers are invited from all the fields of nuclear- and radiochemistry addressing particularly the following topics

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- Nuclear Analytical Methods
- Chemistry of Actinide and Trans-actinide Elements
- Radiation Chemistry
- Production and Application of Radionuclides
- Separation Methods, Speciation
- Chemistry of Nuclear Fuel Cycle, Radiochemical Problems in Nuclear Waste Management
- Radiopharmaceutical Chemistry, Labelled Compounds
- Education

However, the submitted contributions need not be limited to the enumerated topics.

As usually, Equipment and Services Exhibition will be organised in parallel to RadChem 2022.

IMPORTANT DEADLINES

Call for Abstracts: October 2021
Abstracts Submission: 31 January 2022
Authors Notification: February 2022
Hotel Reservation: February/March 2018
Early registration: 19 March 2022
Advance Programme: April 2022
Full Papers: 15 May 2022 (at the on-site registration)

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