Update on the coupling between the In-Flight RIB Facility EXOTIC and AGATA

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Young GAMMAs Workshop, Asiago

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Università degli Studi di Padova

The EXOTIC facility

- In-flight production of **light weakly-bound RIBs**
- It employs **two-body inverse kinematics reactions** with heavy-ion beams delivered from the LNL-XTU tandem accelerator impinging on **gas targets** (**p**,**d**,^{3}**He**)
- The **commissioning** of the facility EXOTIC was performed in **2004**

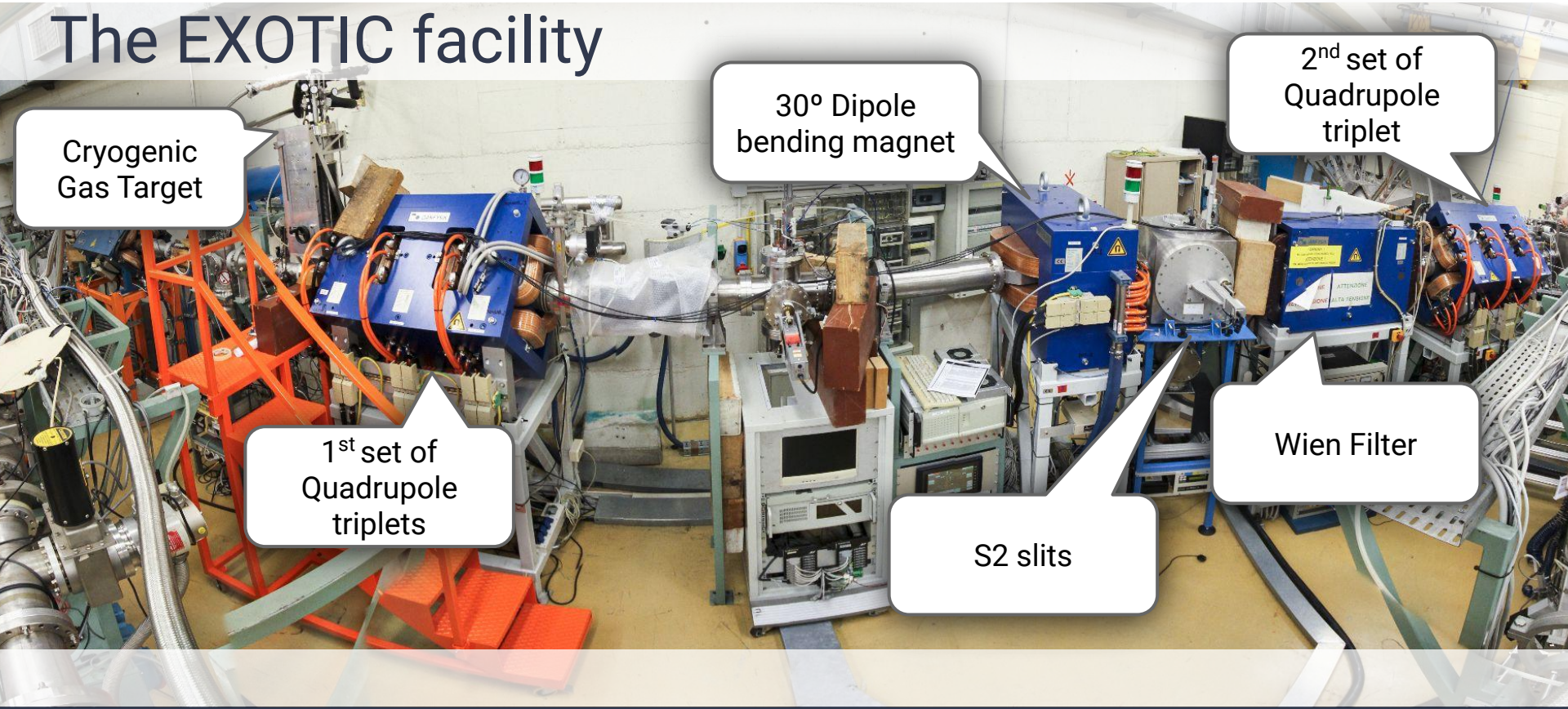
F. Farinon et al., NIM B 266, 4097 (2008)

- In **2012** some upgrades were operated on the facility
  - Installation of a cryogenic gas target
  - Installation of 2 y-steerers …

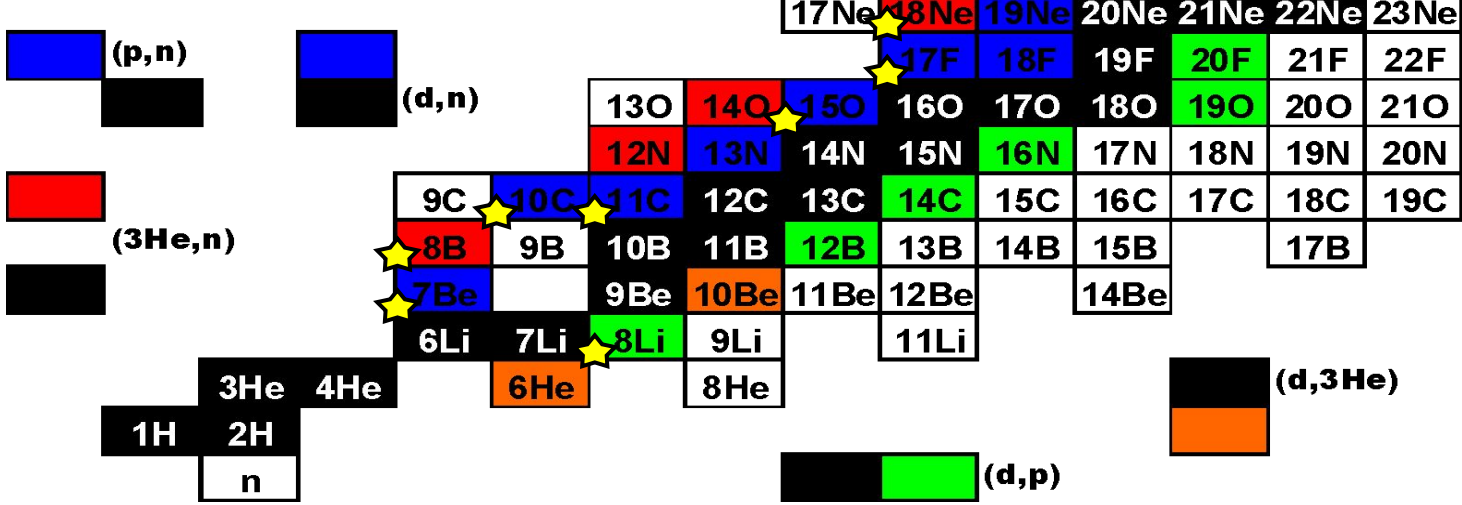
M. Mazzocco et al., NIM B 317, 223 (2013)

- During last year (**2023**), several other upgrades were operated **in order to couple the facility with AGATA**

The EXOTIC facility



Light RIBs



^{17}F	E = 3–5 MeV/u	Purity: 93-96 %	Intensity: 10^5 pps
^{8}B	E = 3–5 MeV/u	Purity: 30-43 %	Intensity: ~ 10^3 pps
^{7}Be	E = 2.5–6 MeV/u	Purity: 99 %	Intensity: 10^6 pps
^{15}O	E = 1.3 MeV/u	Purity: 97-98 %	Intensity: $4*10^4$ pps
^{8}Li	E = 2–2.5 MeV/u	Purity: 99 %	Intensity: 10^5 pps
^{10}C	E = 4 MeV/u	Purity: 99 %	Intensity: $5*10^3$ pps
^{11}C	E = 4 MeV/u	Purity: 99 %	Intensity: $2*10^5$ pps
^{18}Ne	E = 1.3 MeV/u	Purity: 95 %	Intensity: $6*10^3$ pps (under dev.)

EXOTIC + AGATA

- **October 2023:** Installation of a new reaction chamber downstream the EXOTIC line

EXOTIC + AGATA

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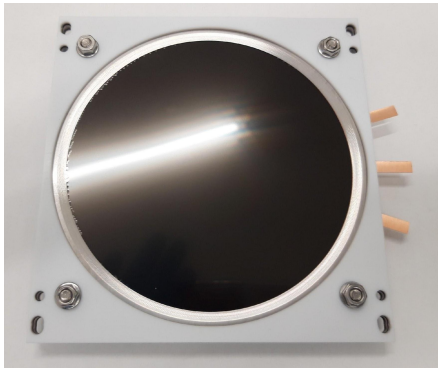
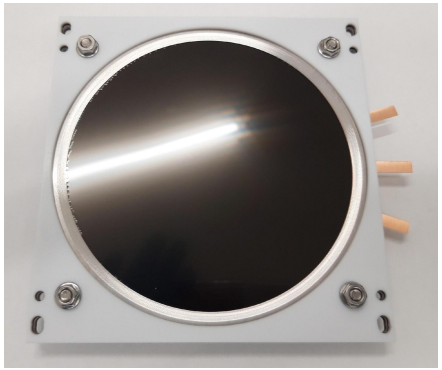
- Developement of the 1st **Micro-Channel Plate** (MCP) detector



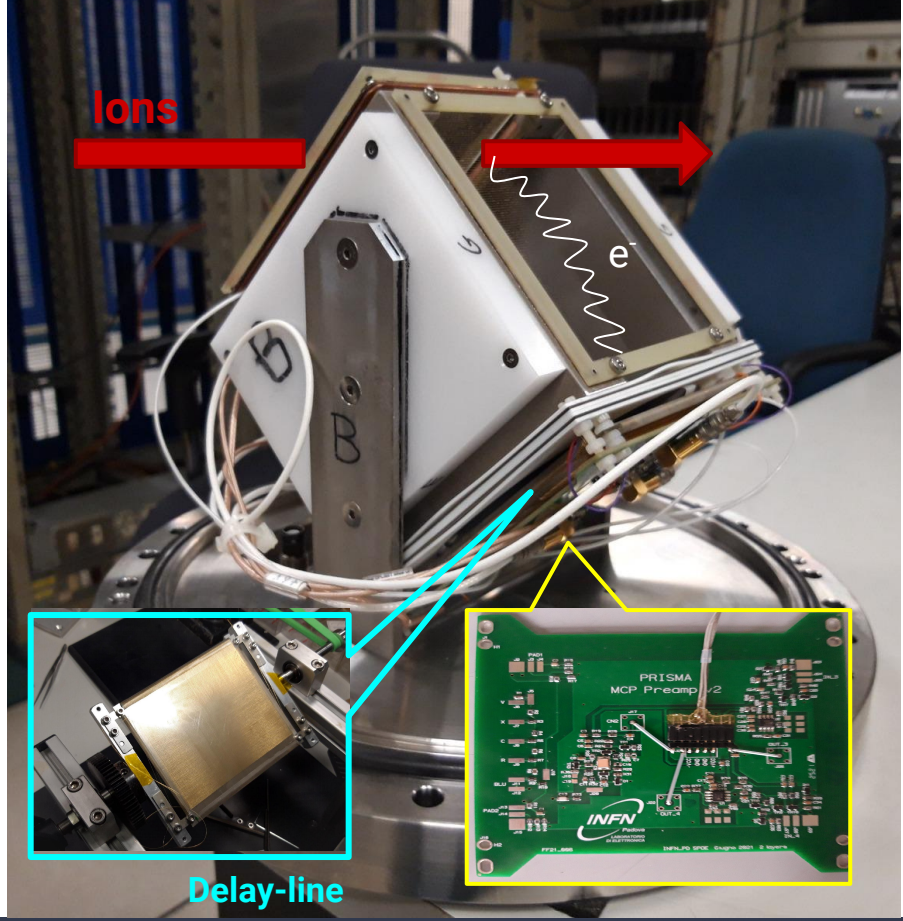
EXOTIC + AGATA

- **October 2023:** Installation of a new reaction chamber downstream the EXOTIC line
- Developement of the 1st **Micro-Channel Plate** (MCP) detector
- **May-June 2024:** Installation of the second chamber and mounting of 2nd MCP

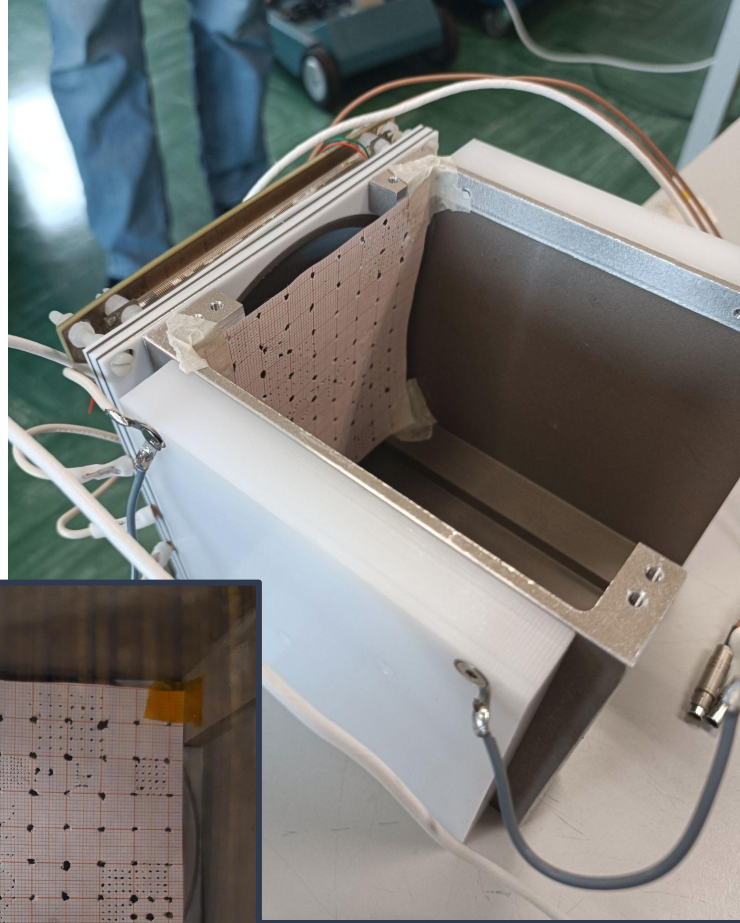


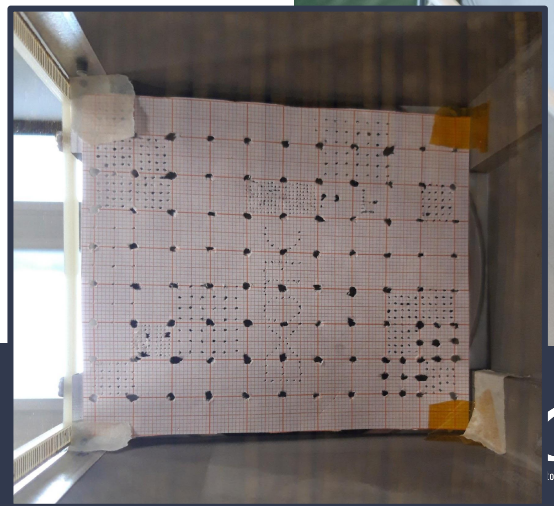
Micro-Channel Plate

- Aluminized Mylar foils
  - + LiF (to increase efficiency)
- Position-sensitive detector
  - Reconstruction of X and Y hit position
  - **Position-tracking of the RIB between 2 MCPs**
- Time signal of the hit
  - **Time-of-Flight (ToF) reconstruction between 2 MCPs**



Position resolution





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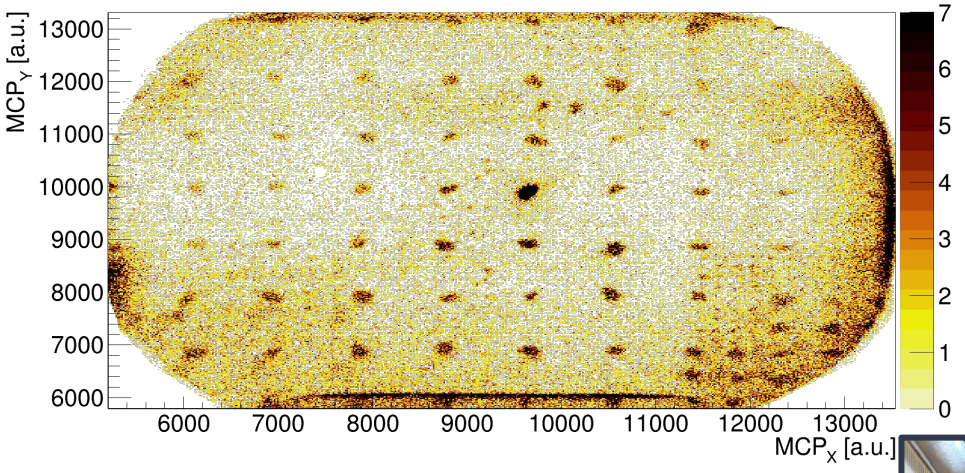

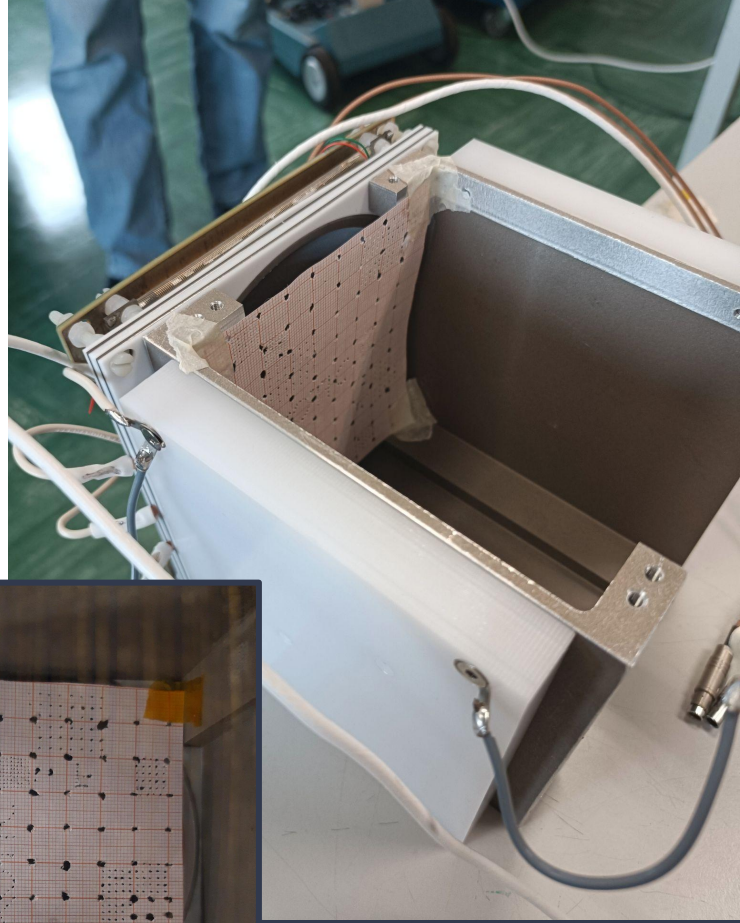

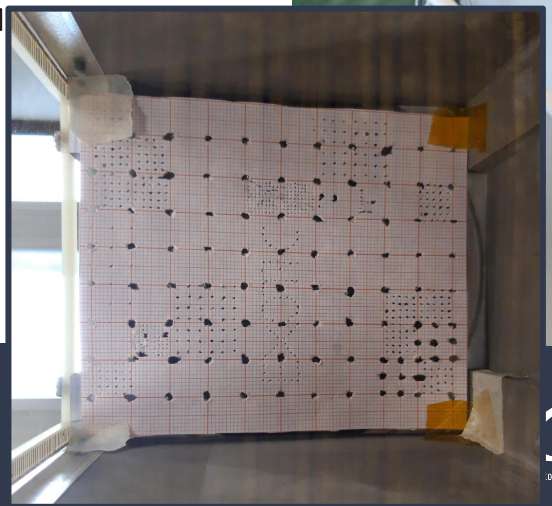

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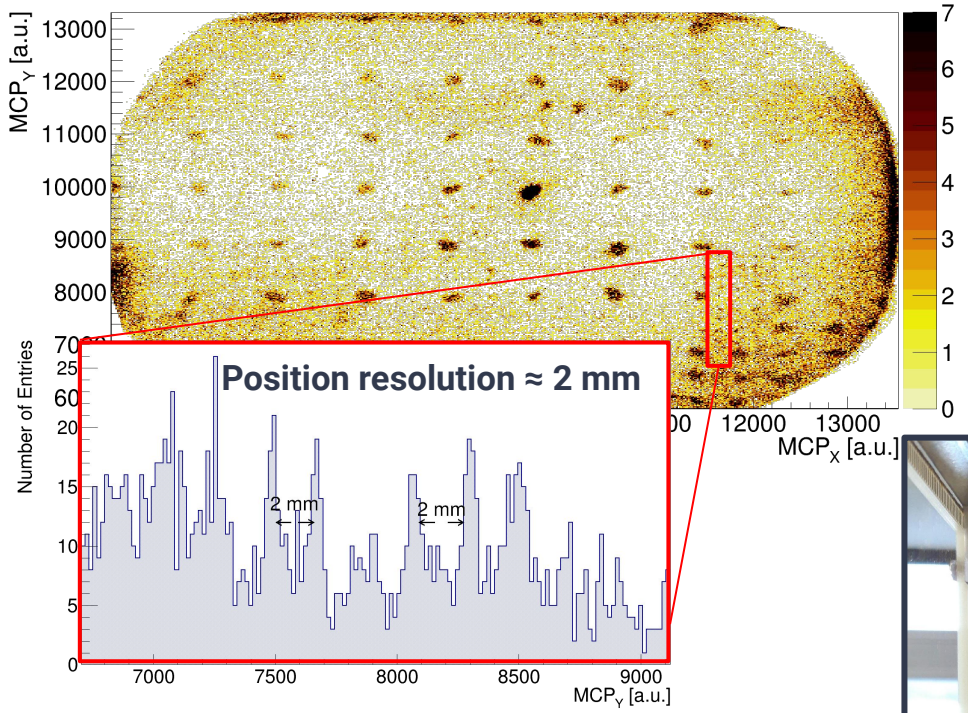
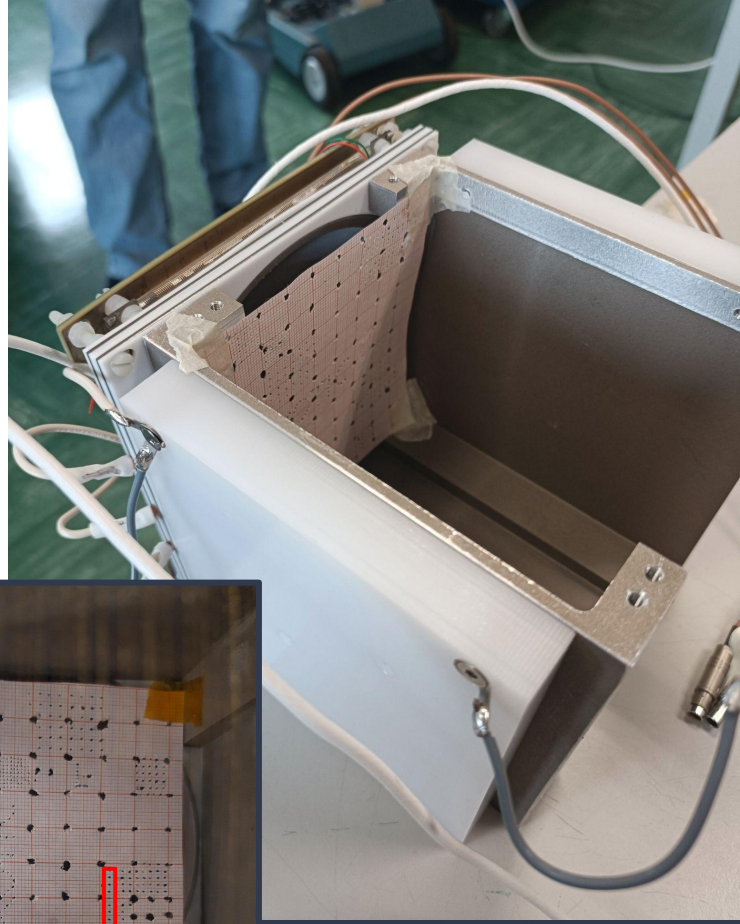
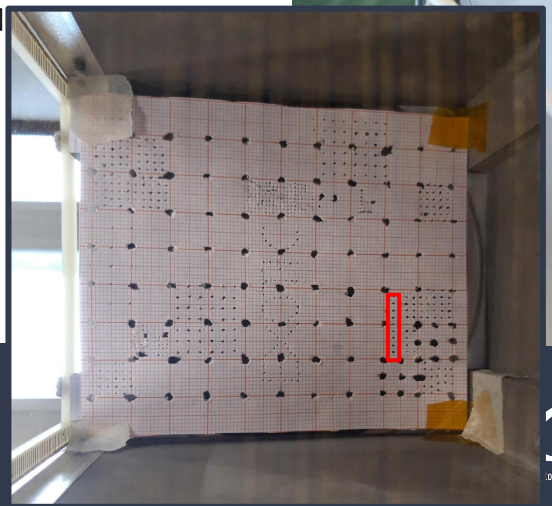
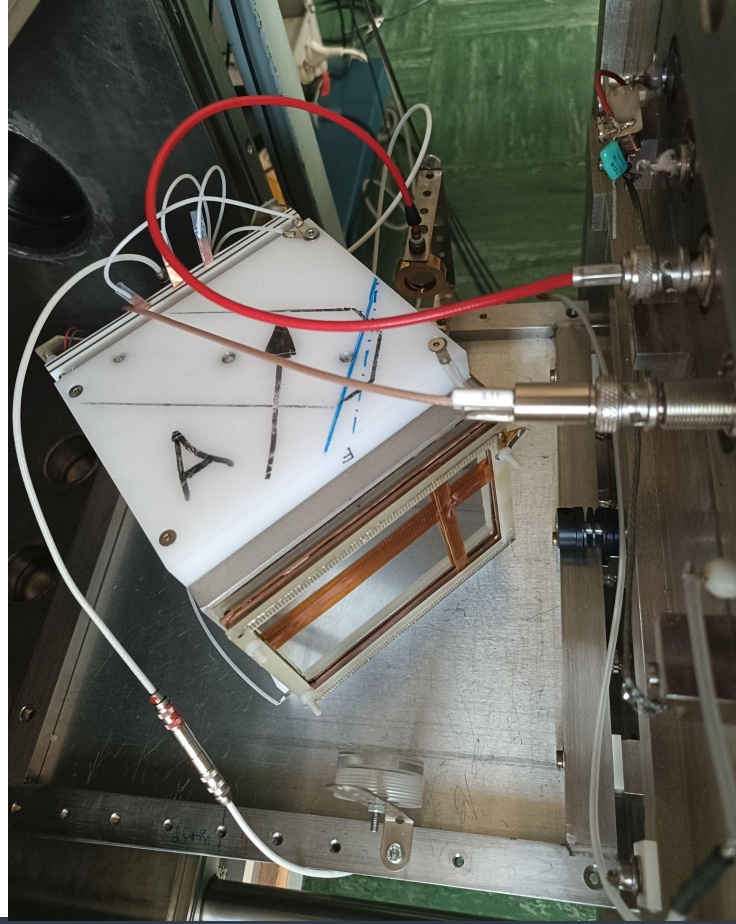






Efficiency and ToF resolution

- MCP + Surface barrier Silicon detector



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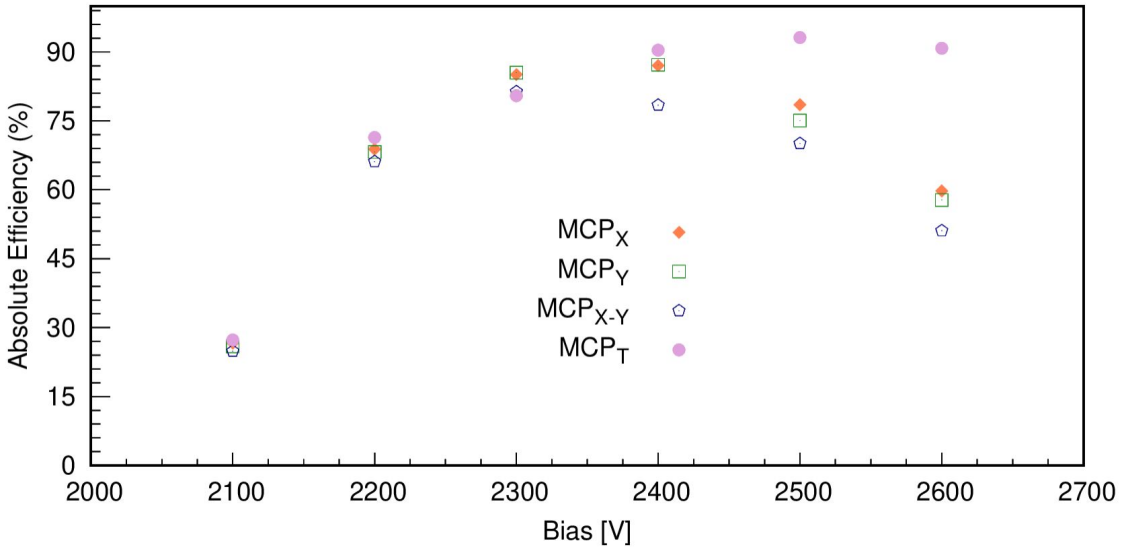

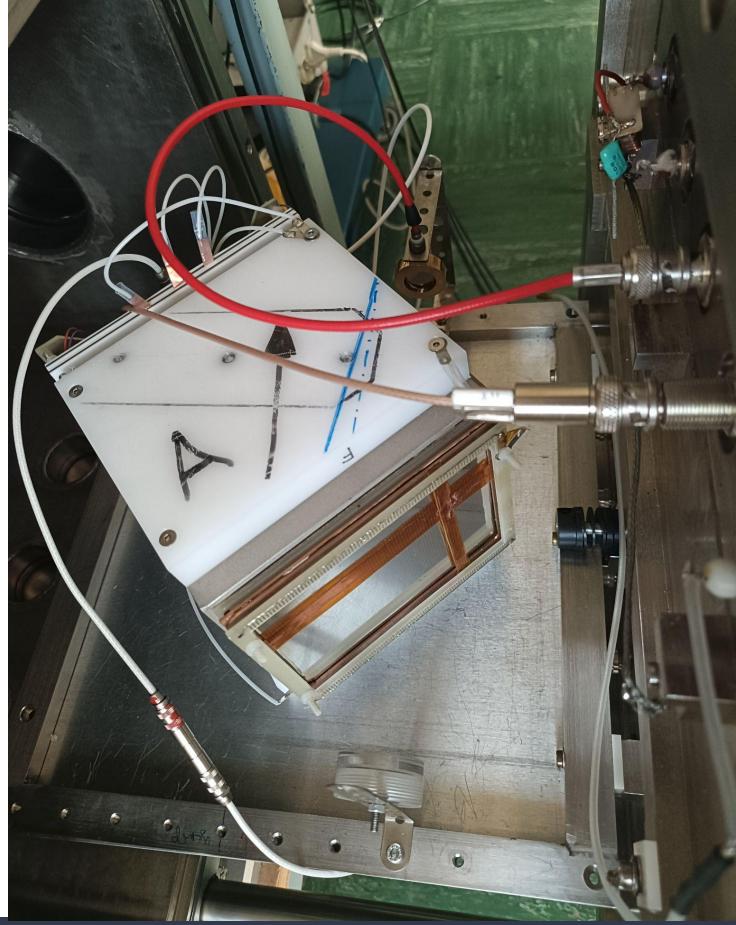

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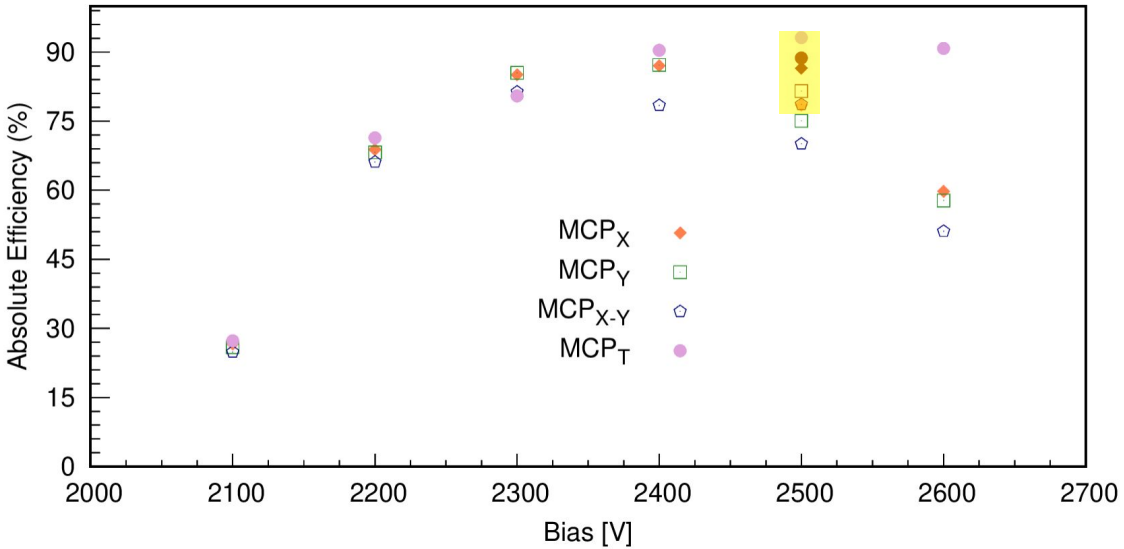

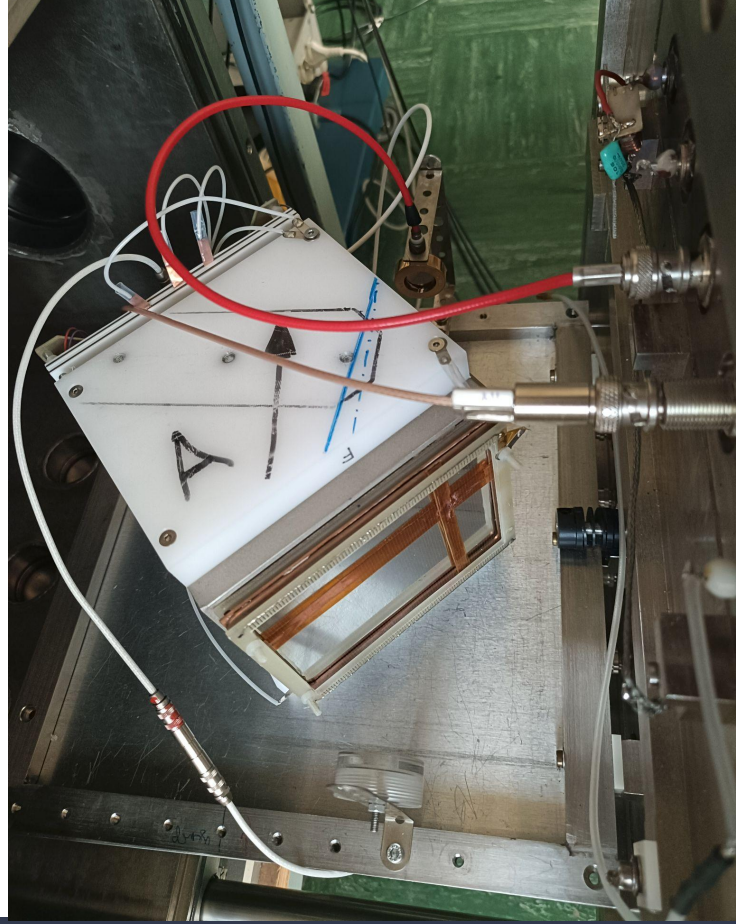

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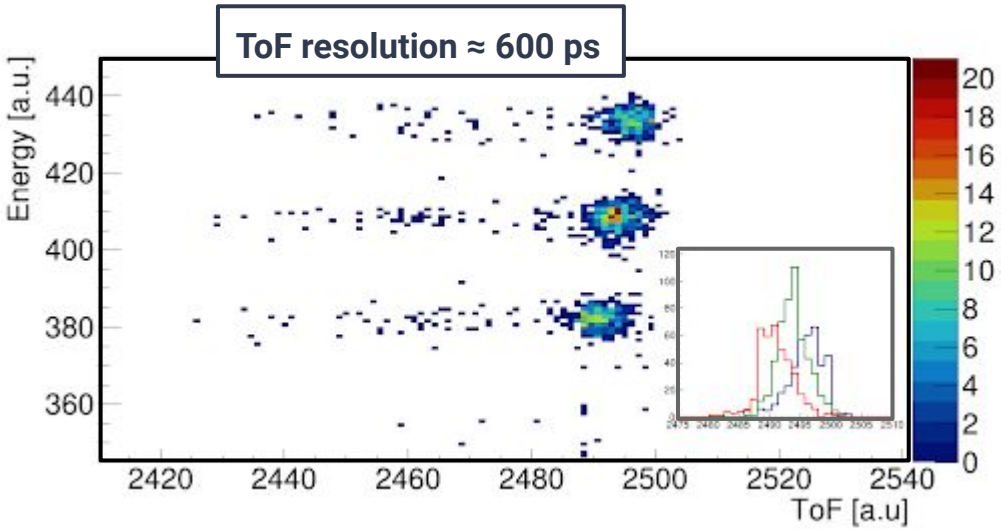
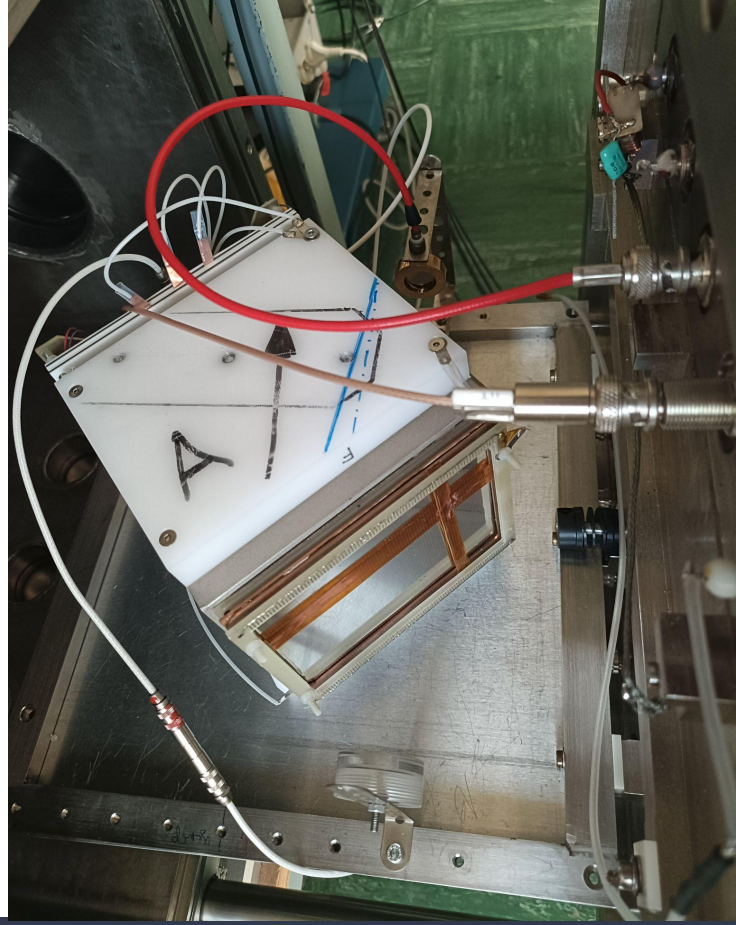
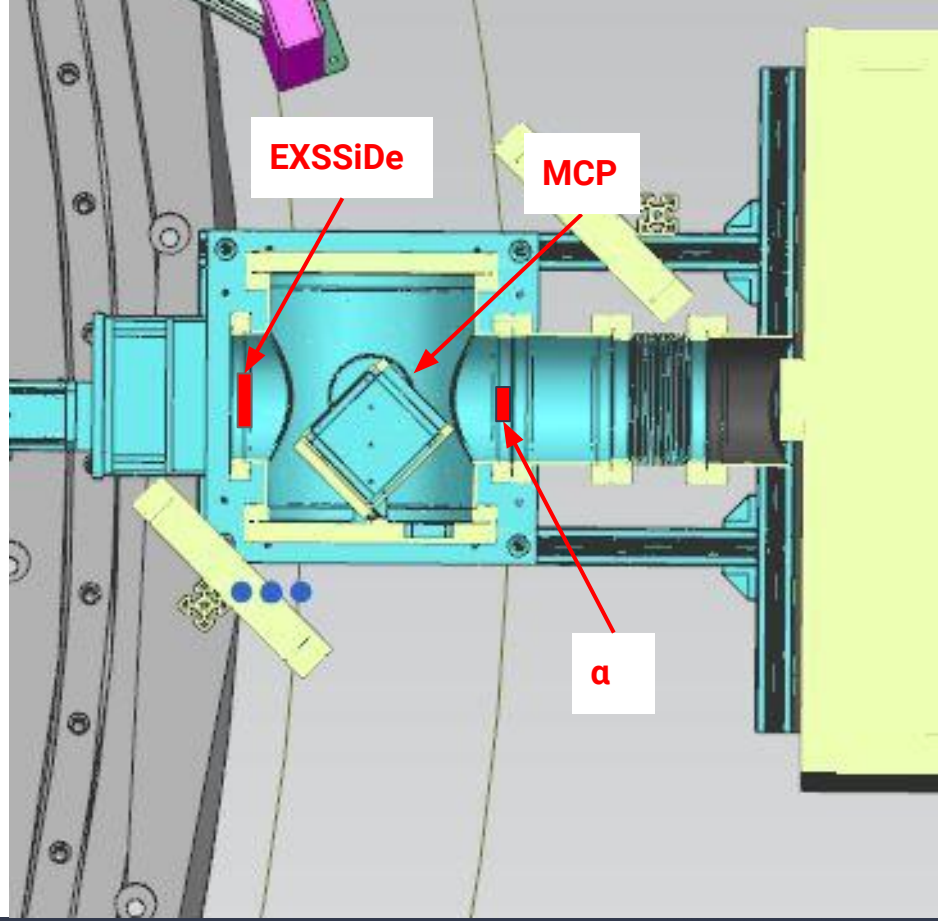




Position tracking

EXotic Silicon Strip Detector (EXSSiDe)
Area: 64 mm x 64 mm
Thickness: 1 mm
Strip: 32 vertical x 32 horizontal
Position Resolution: 2 mm x 2 mm



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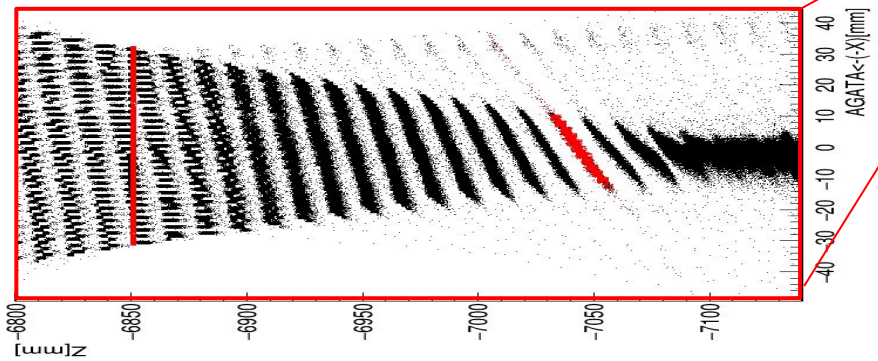

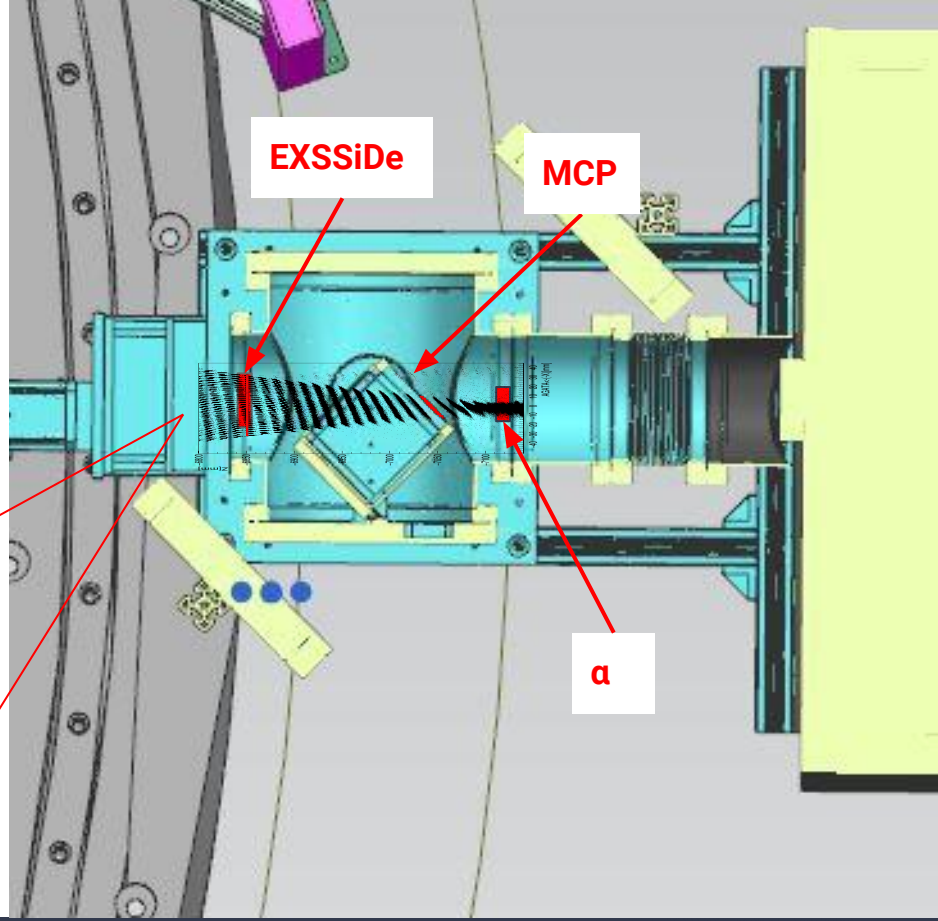

Timeline

Ph. 0: 2023-2024

MCP characterization with off-line tests:
-position and ToF res., efficiency …

Ph. 1: July 2024

In beam test of tracking with 2 MCPs + DSSSD

Ph. 2: Nov. 2024?

Transport to AGATA focal plane:
optimization of focusing and transport efficiency

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Experimental campaign

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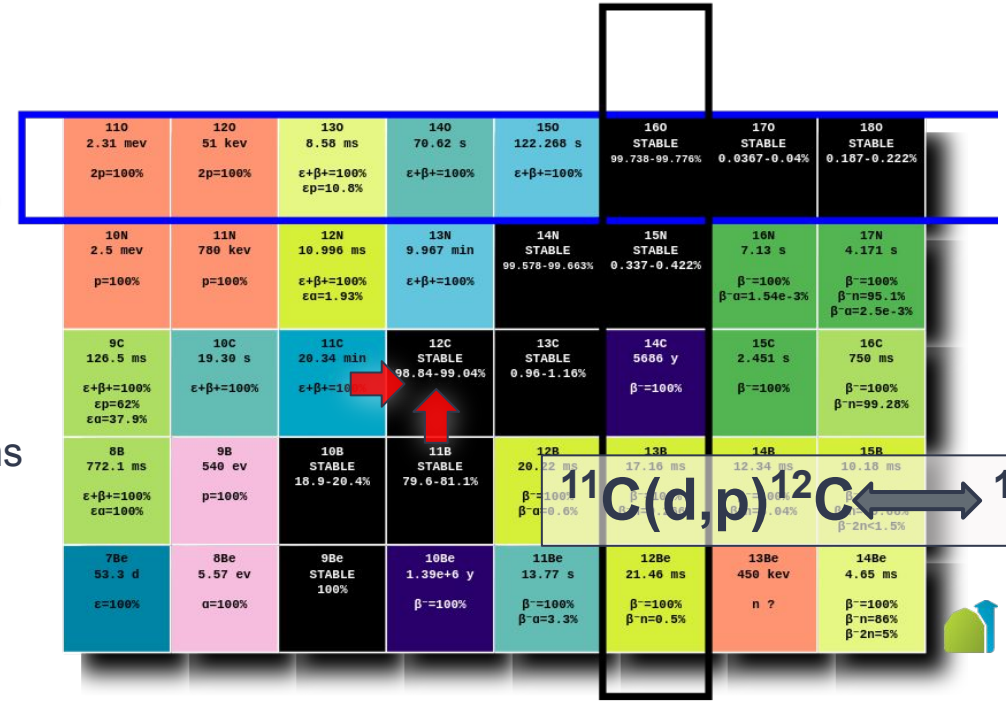
Isospin Symmetry Breaking for **A=11** (A. Gottardo)

Are there **nuclear contributions** to breaking of the Isospin Symmetry?



Ab-initio calculations possible for A=11!

Same reaction in Isospin Symmetry

$^{11}C(d,p)^{12}C \Longleftrightarrow {}^{11}B(d,n)^{12}C$

Thank you!

Commissioning of the coupling between EXOTIC and AGATA (Part III)

EXOTIC

Spokespersons: S. Pigliapoco[1], D. Brugnara[2], M. Mazzocco[1], J. J. Valiente-Dobon[2]

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