

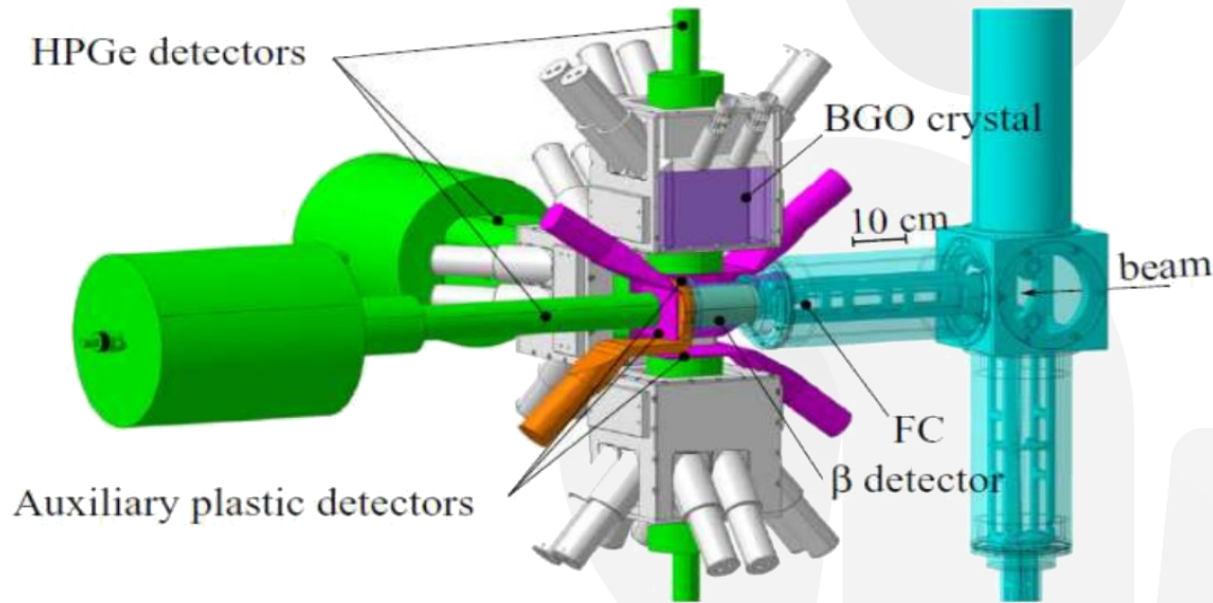
# IDEAS<sup>3</sup>

Identification and DEcay Assisted by S<sup>3</sup>

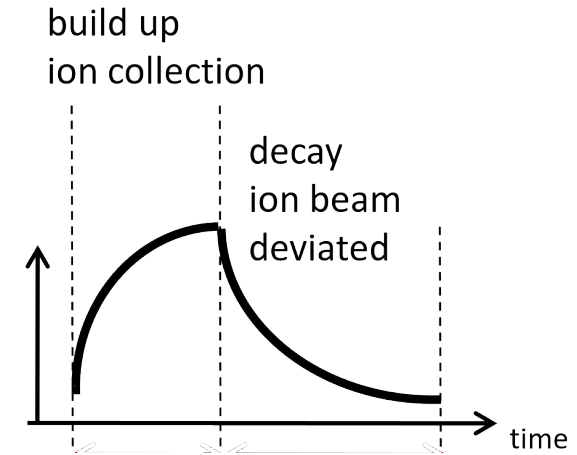
ISOL-France 2024

*Léo Plagnol*

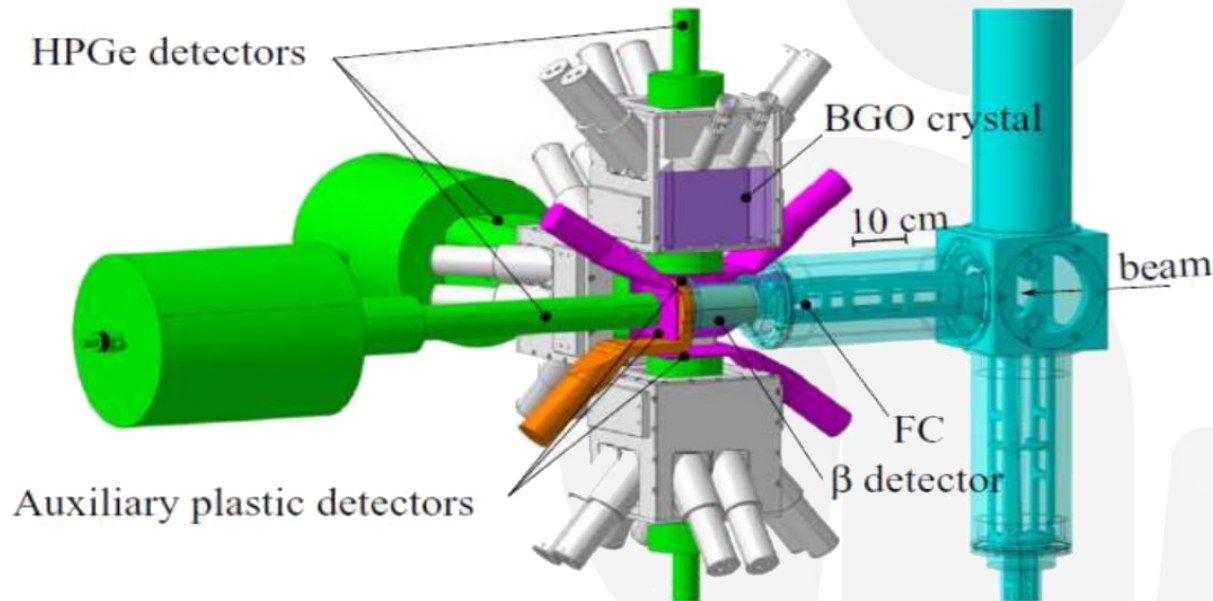
## BEDO @ ALTO



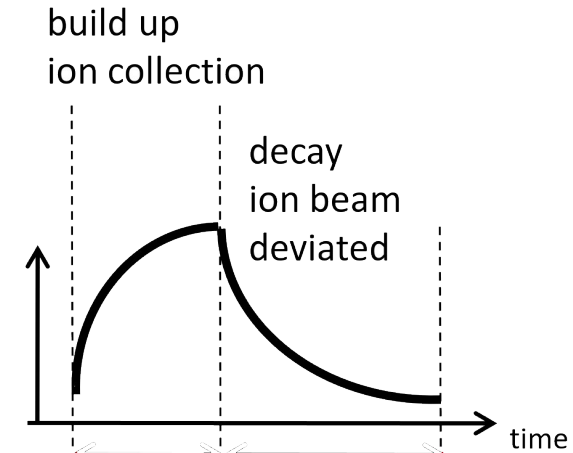
- Beam collection on a tape



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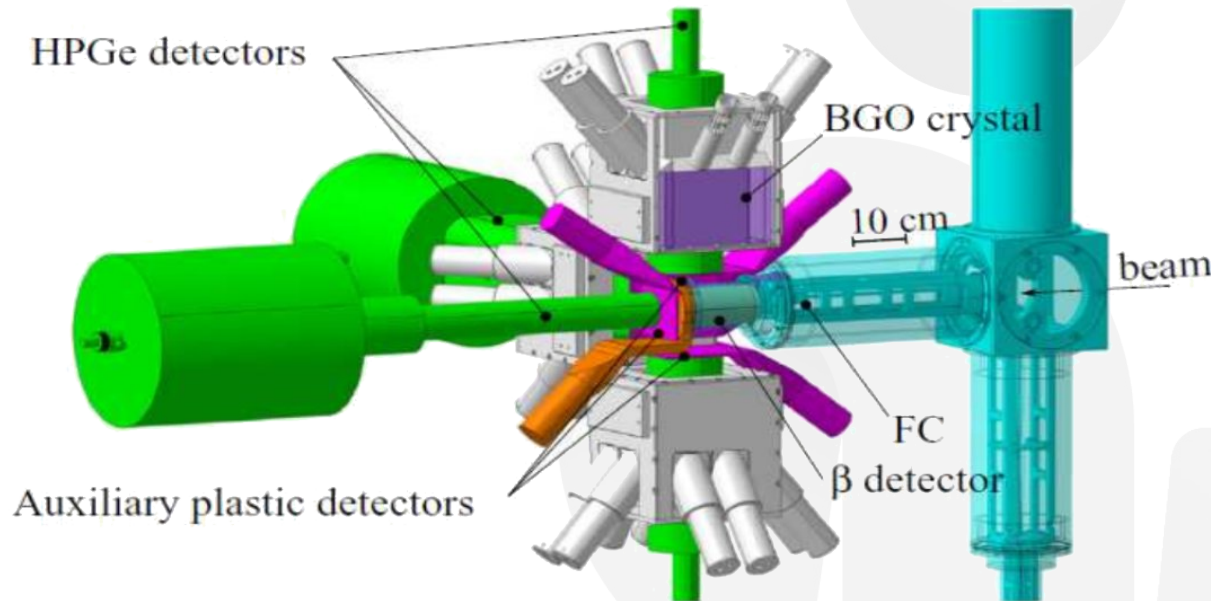


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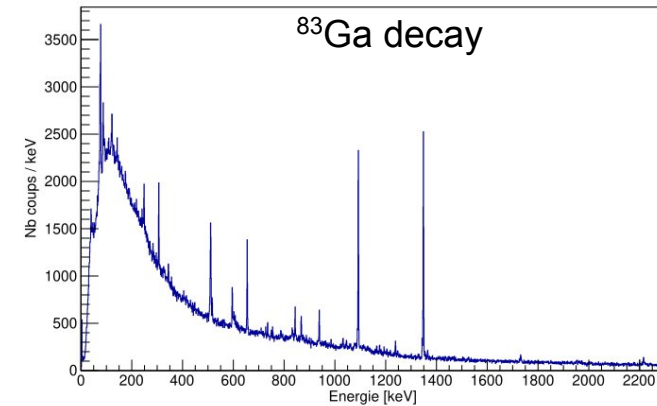


- $\beta$ -decay tagging : plastic scintillator ( $\epsilon \sim 70\%$ )
- Retractable faraday cup
- HPGe for high resolution
- LaBr3 for efficiency
- Background reduction system

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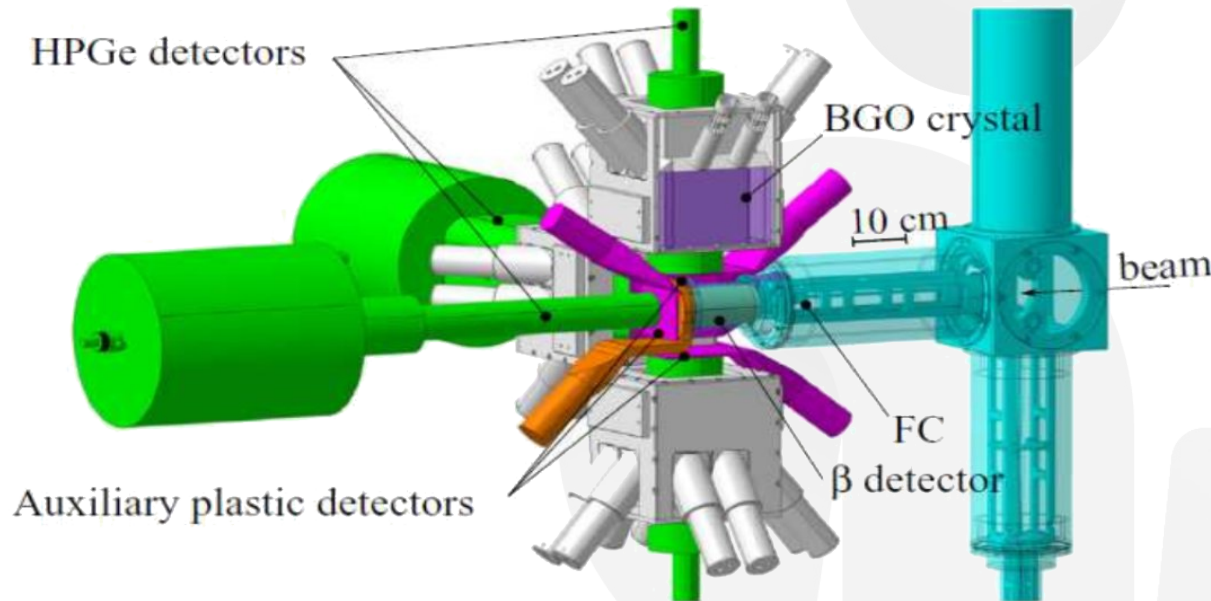


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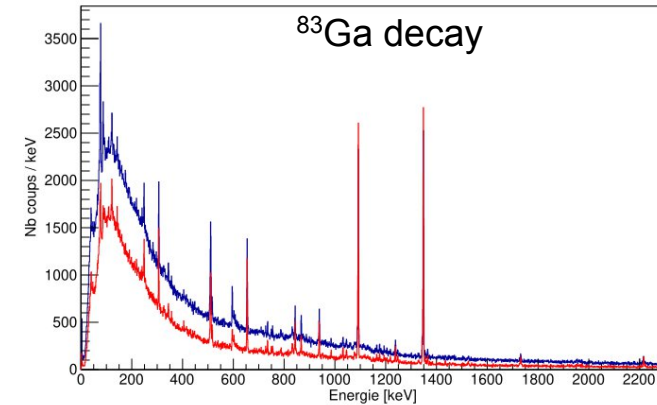


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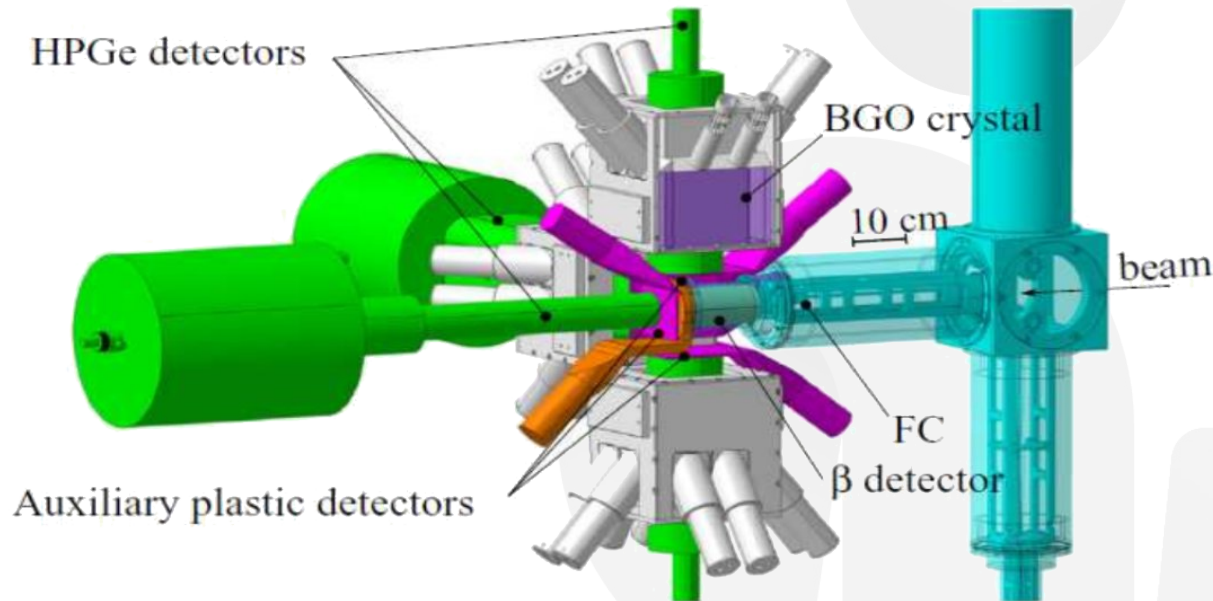


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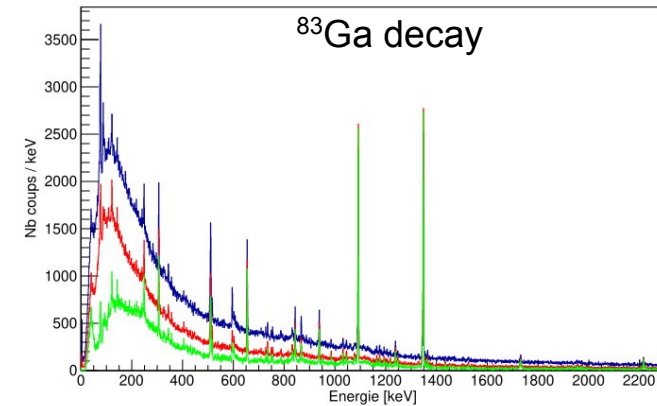


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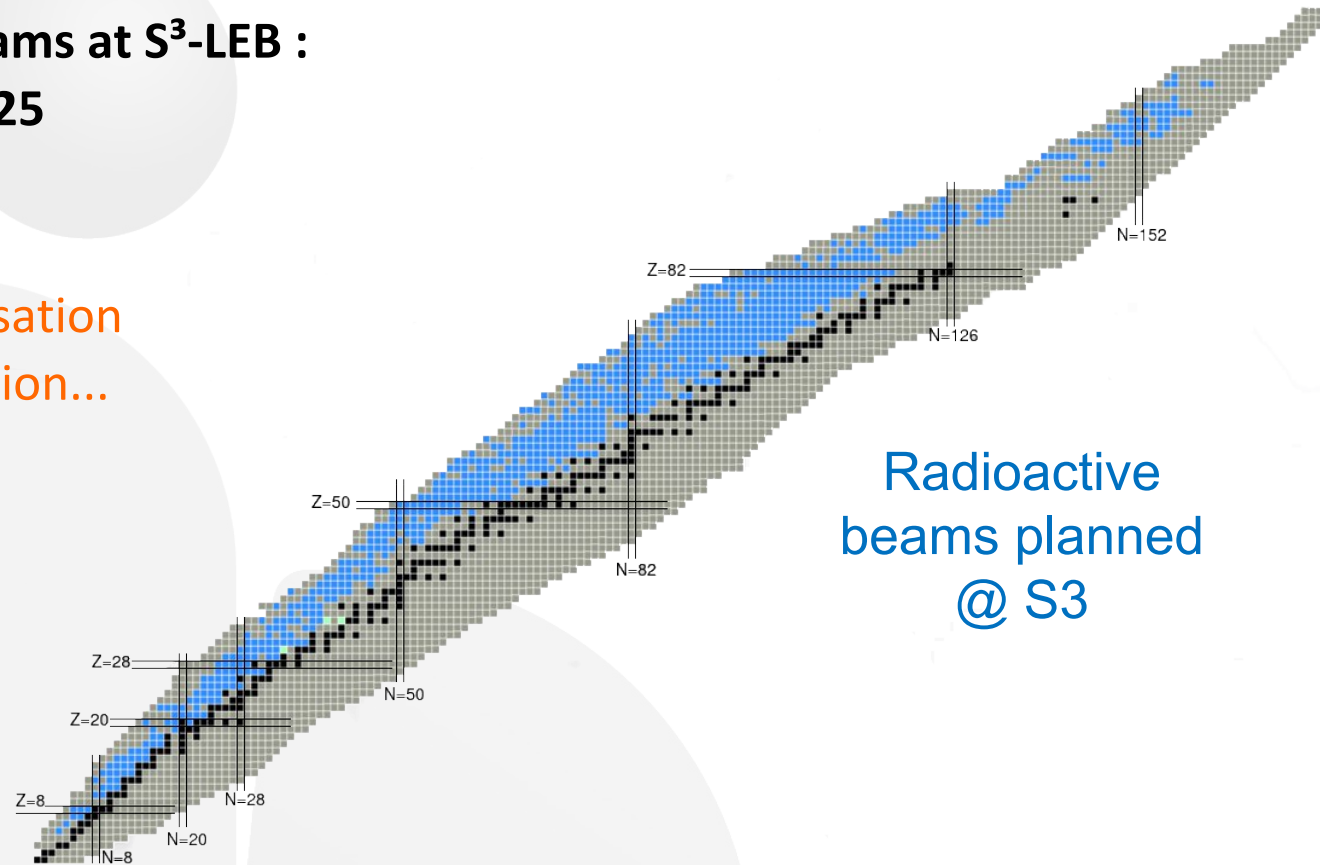
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## Upcoming availability of proton-rich beams at S<sup>3</sup>-LEB :

➤ Commissioning S<sup>3</sup> planned late 2025

### • Necessity of an identification station :

- Beam identification and characterisation
- Intensity, contaminants quantification...



## Upcoming availability of proton-rich beams at S<sup>3</sup>-LEB :

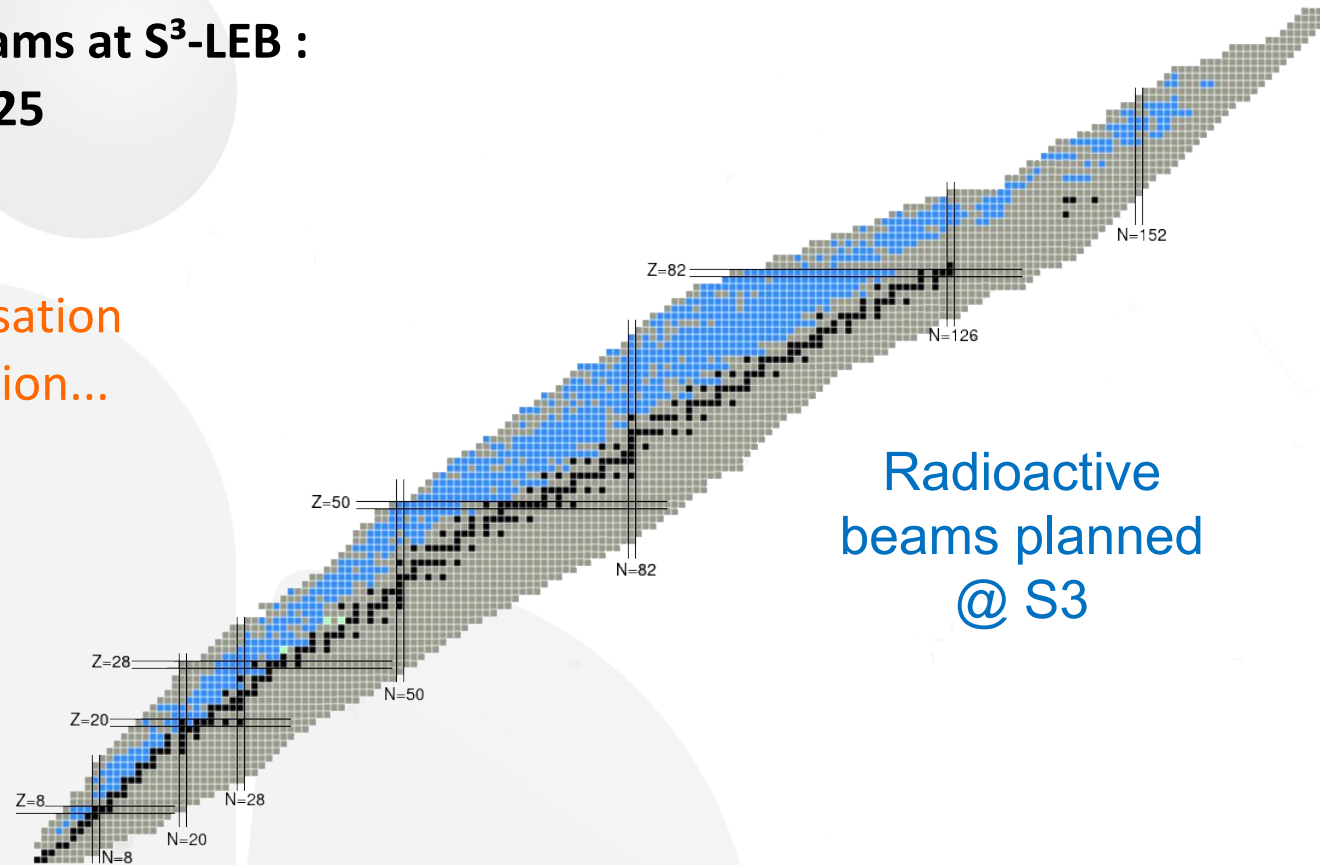
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### • Necessity of an identification station :

- Beam identification and characterisation
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### • Possibility : S<sup>3</sup> beam spectroscopy

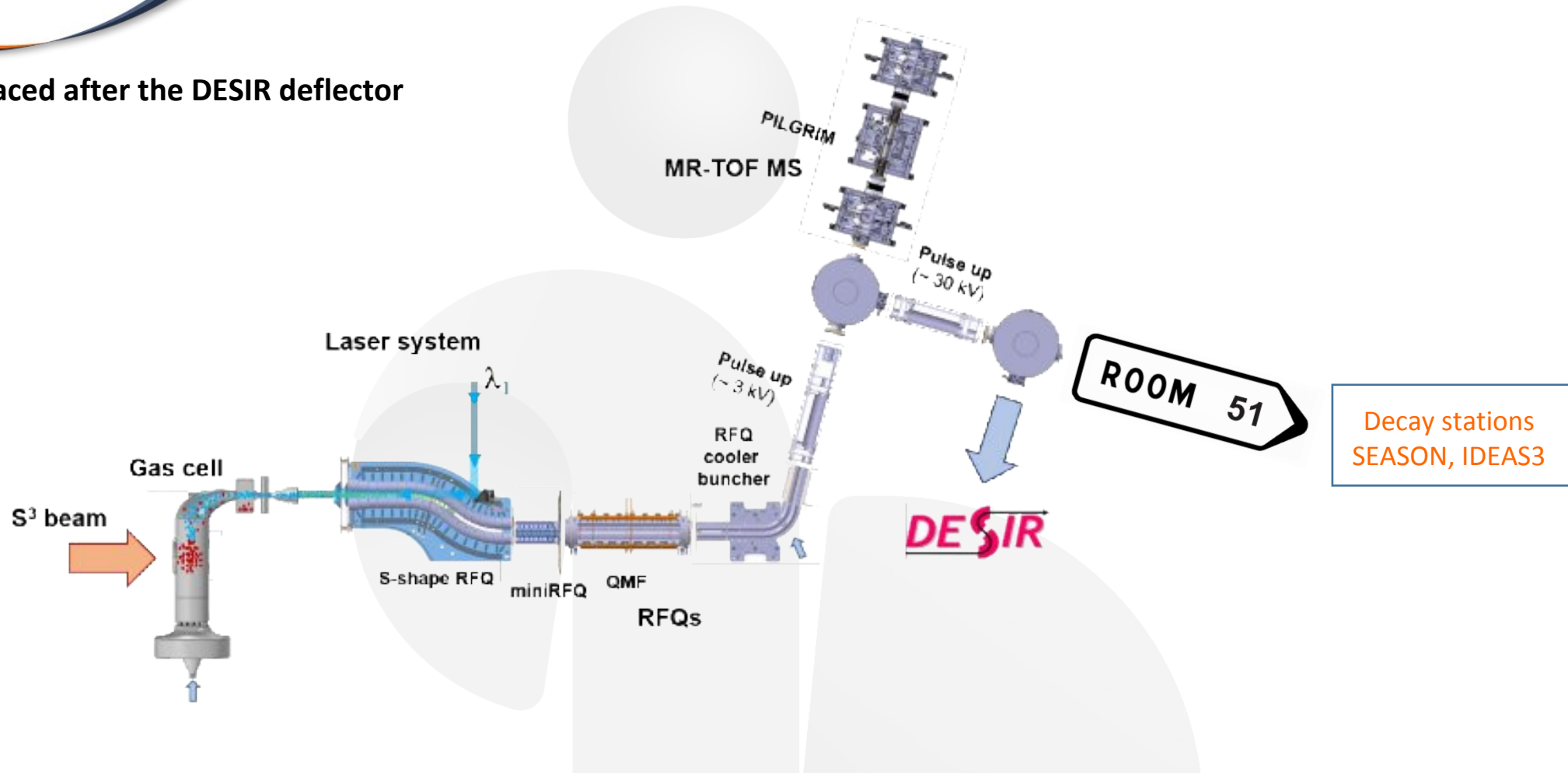
- Beta-delayed charged particles
- Physics around N=Z
- <sup>100</sup>Sn region  
(p-n pairing, deformations...)



Radioactive  
beams planned  
@ S3

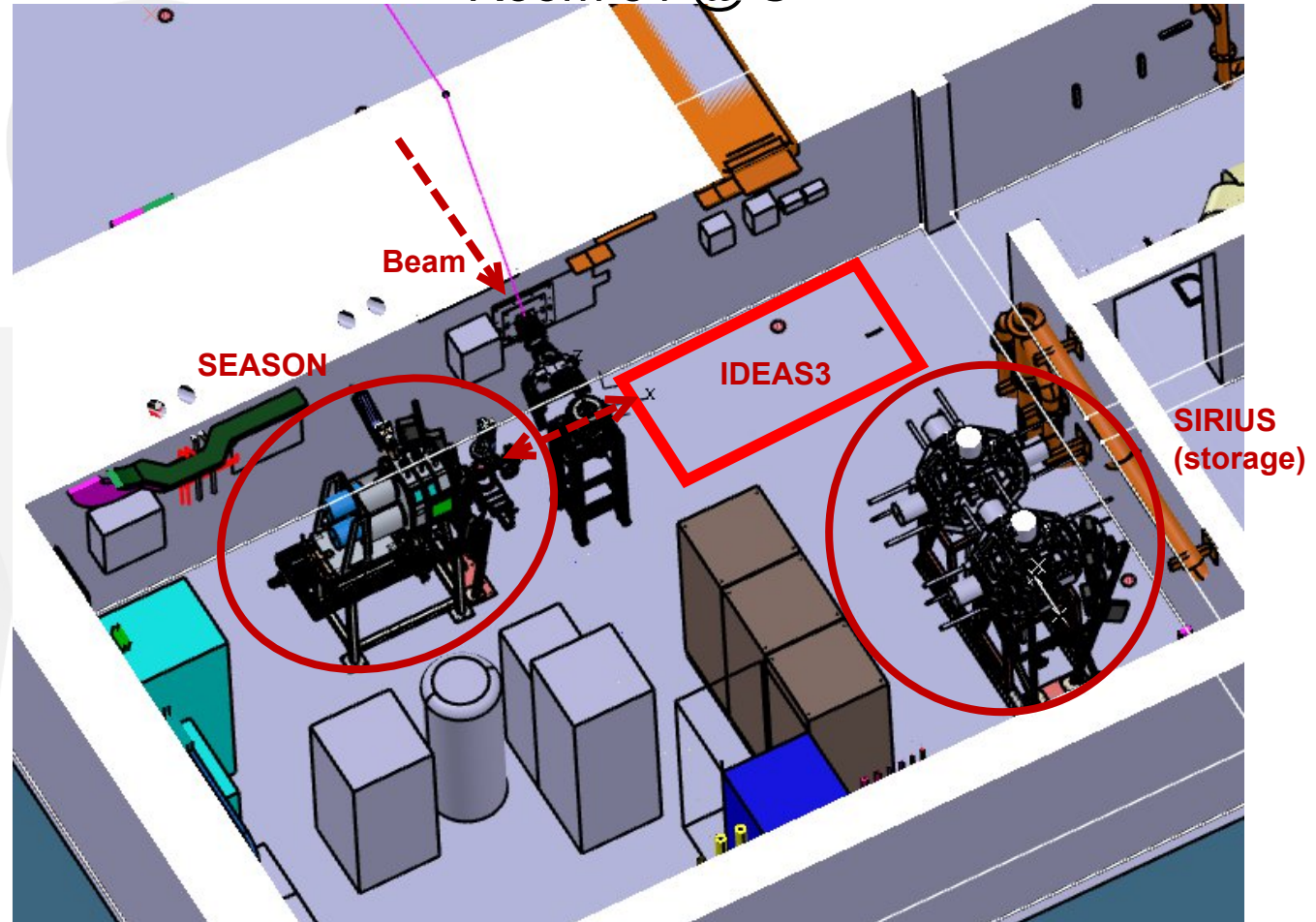


- Placed after the DESIR deflector



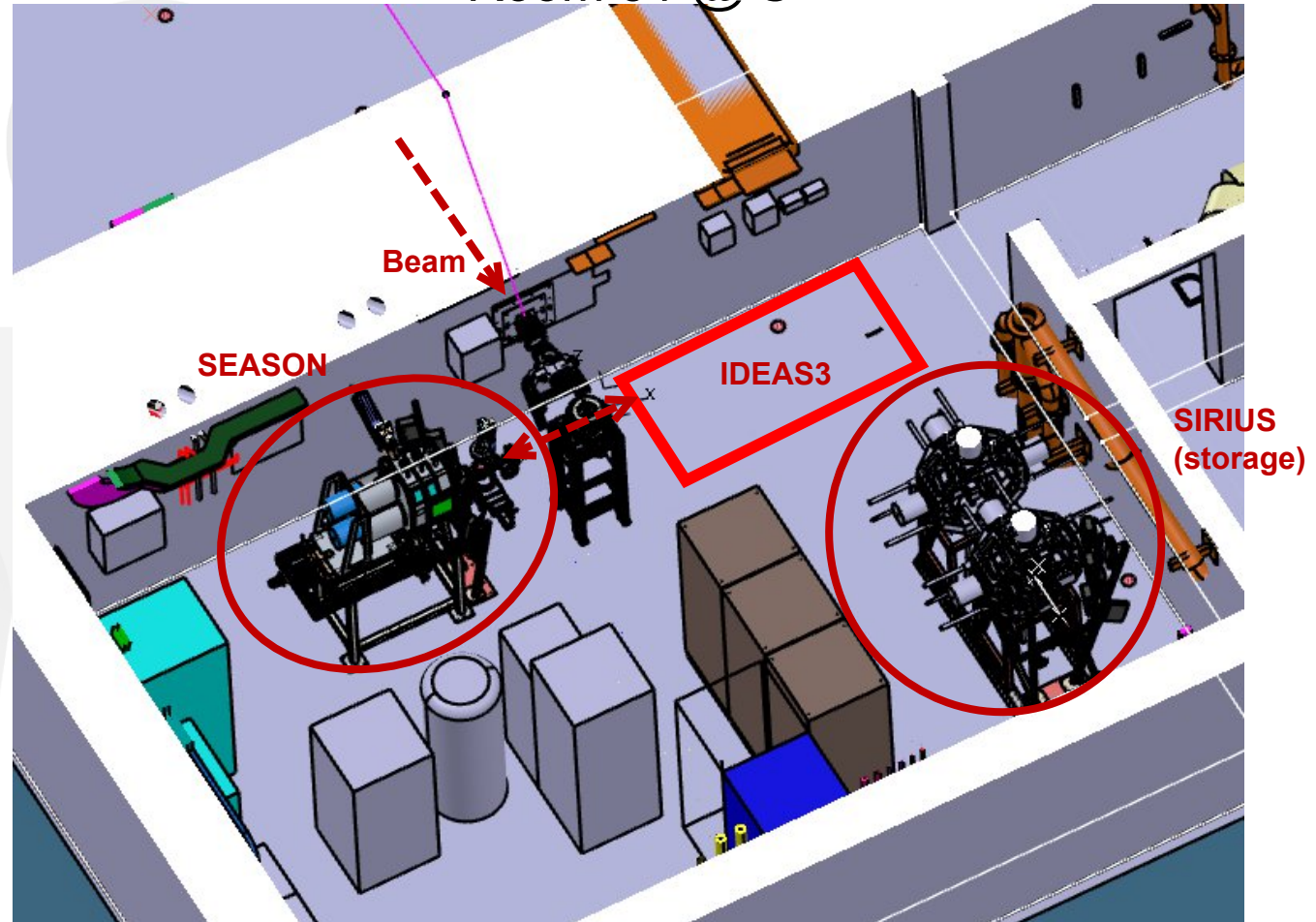
- Placed after the DESIR deflector (room 51)
- Spatial constraint

Room 51 @ S<sup>3</sup>

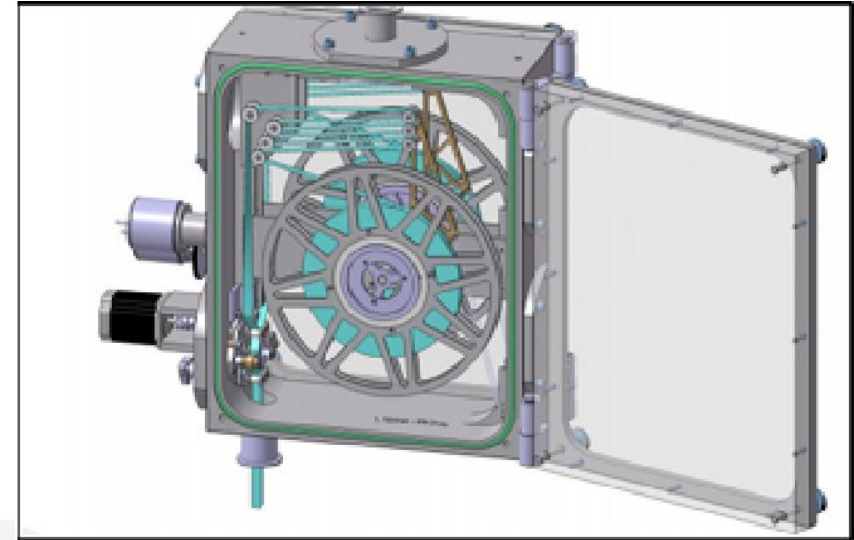


- Placed after the DESIR deflector (room 51)
- Spatial constraint
- Challenges :
  - **Simplicity :**
    - Installation
    - Repairing
    - Use & analysis (plug-and-play)  
→ few electronic channels
  - **Modularity**
    - Adaptation to needs  
e.g. quick transition to  
« identification » configuration :  
→ Replacing a HPGe by a detector  
more useful for ID  
(electrically-cooled detector ?)

Room 51 @ S<sup>3</sup>



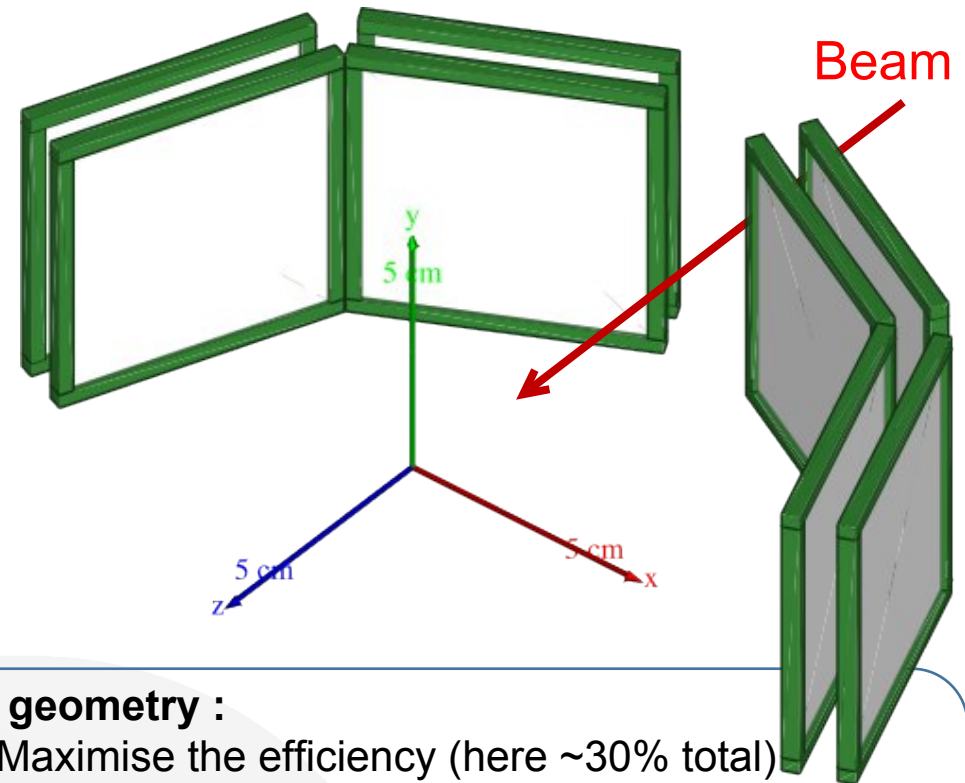
- Design based on BEDO@ALTO
- Beam collected on a tape



- Below the beam line
- Based on latest design
- Collection point = measurement point

- Design based on BEDO@ALTO
- Beam collected on a tape
- Multiple observables :
  - $\beta^+$  & particle tagging :
    - 4 (?) Silicon telescopes ( $\Delta E-E$  or veto)

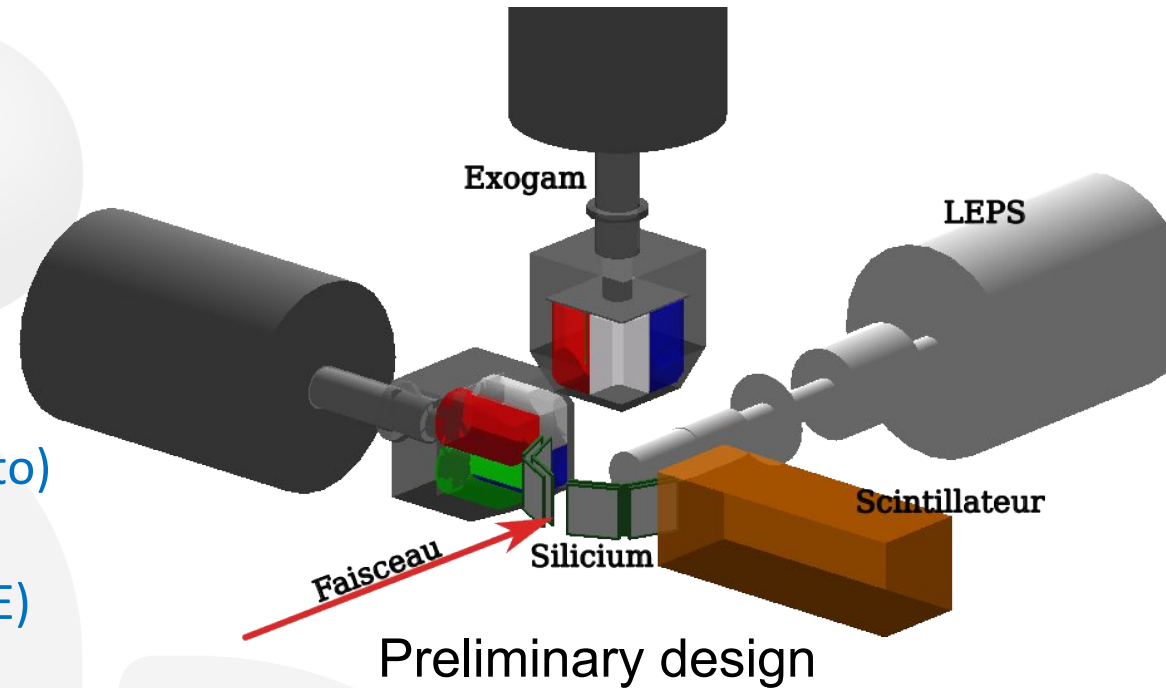
To be confirmed by simulations



### Silicon geometry :

- Maximise the efficiency (here ~30% total)
- Have Silicon detectors facing the collection point
- Same radii
- Not in front of X-ray detectors
- Thickness  $\leftrightarrow$  sensitivity

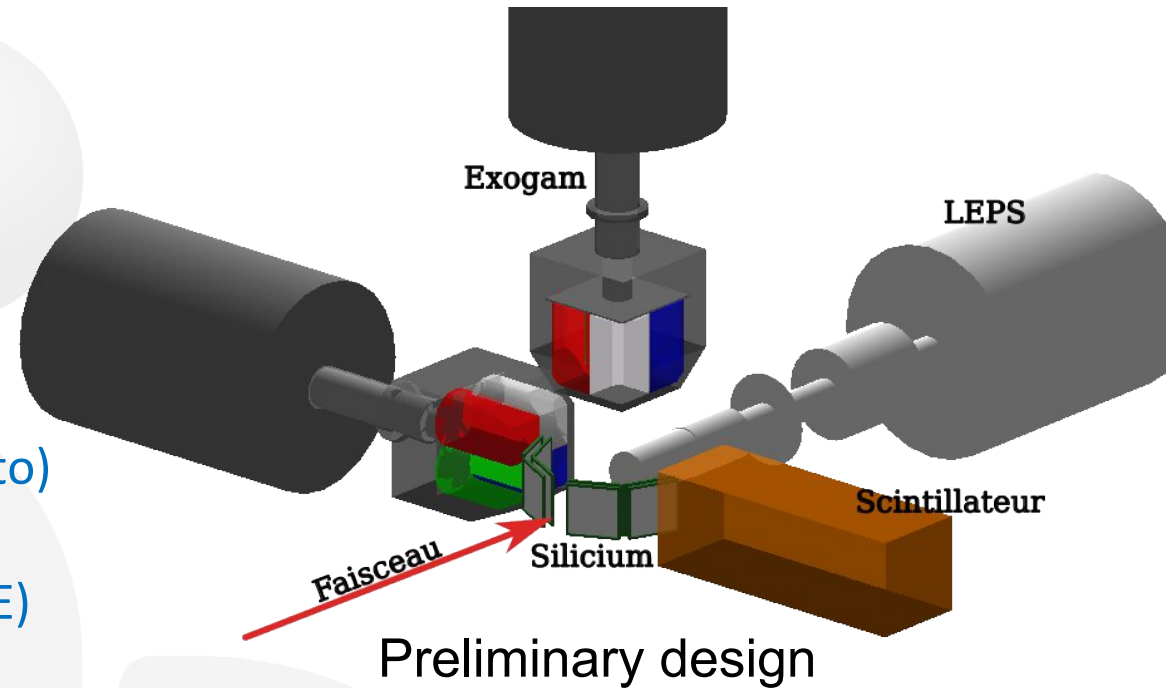
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  - Gamma-spectroscopy
    - HPGe (Exogam ? - Big volume HPGE)
    - Scintillator (CeBr3)
  - X-ray spectroscopy
    - Planar Germanium detector (LEPS)
  - $\beta$ -delayed proton spectroscopy
    - Silicon detectors



Geometry of the setup  
being simulated in  
Geant4 - nptool

- Design based on BEDO@ALTO
- Beam collected on a tape
- Multiple observables :

- ID → •  $\beta^+$  & particle tagging :
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Geometry of the setup
   
 being simulated in
   
 Geant4 - nptool

## Ready components

- HPGe (if EXOGAM)
- LEPS (to be tested)

## To be acquired/constructed

- **Tape transport system**
  - Constructed @ IJCLab
  - Is being finished
  - Coating for the wheels to be determined

- **Vacuum chamber**
  - To be constructed at IJCLab
- **Silicon detectors**
  - Thickness to be determined
  - To be bought
- **CeBr3 scintillator**
  - Size tbd
  - To be bought
- (... Dedicated HPGe ?)



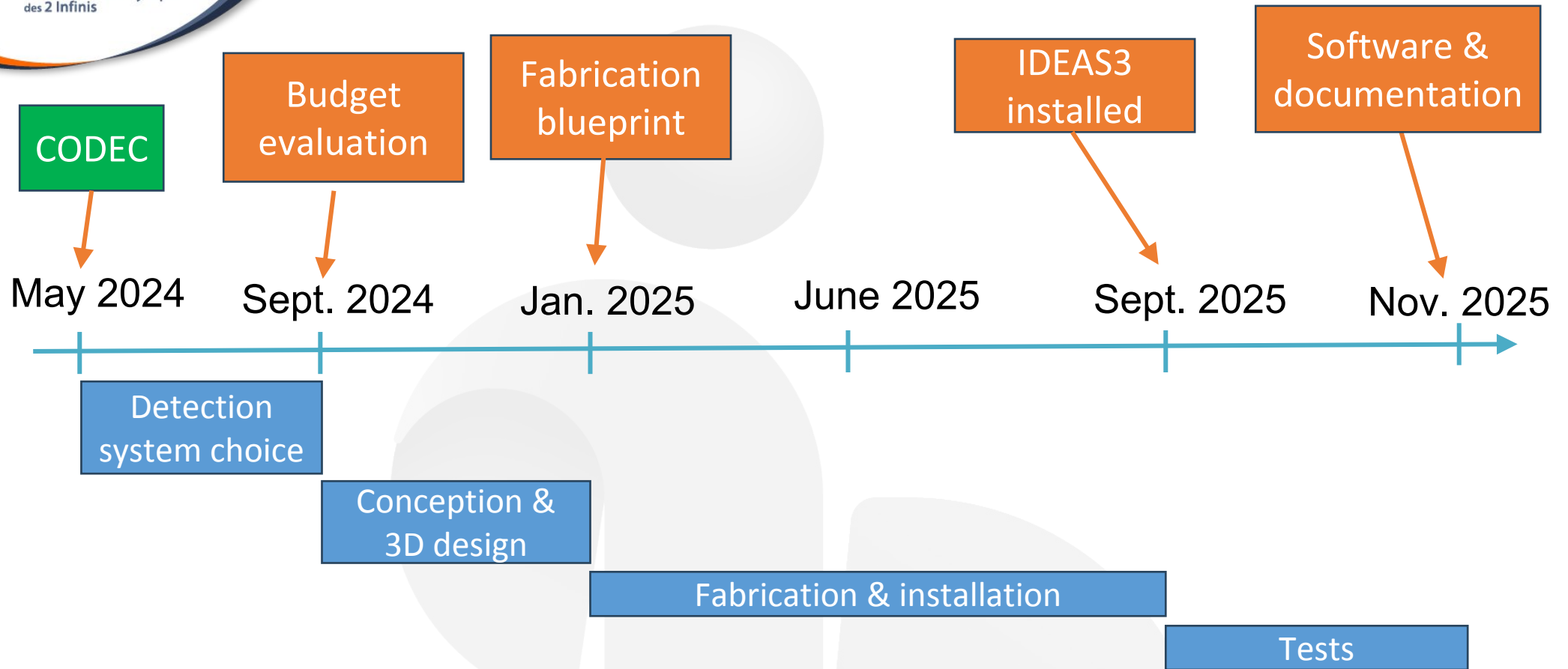
CODEC

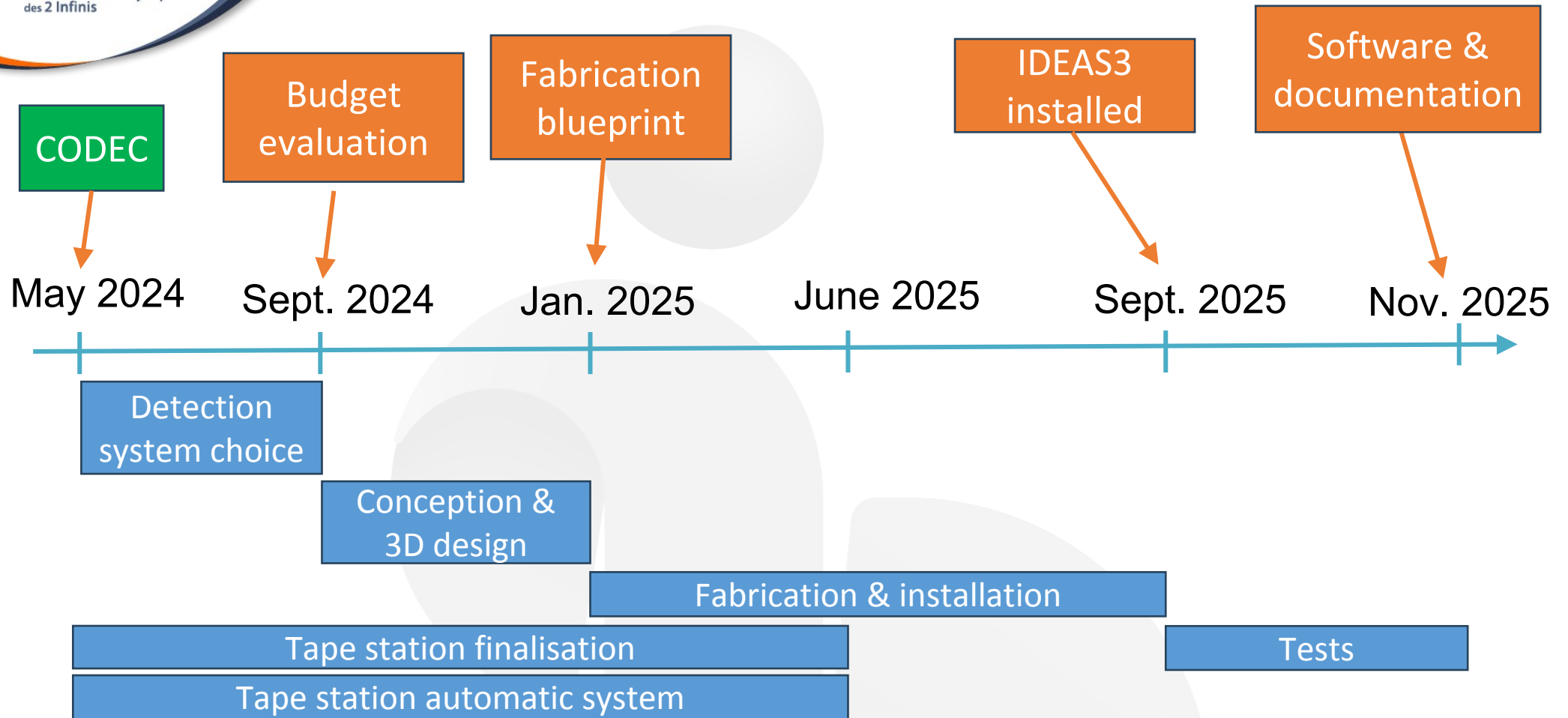
- Project evaluated by IJCLab (14th May)
- Human resources allocated
  - 1.40 FTE researchers & 1.76 FTE IT

May 2024

Sept. 2024

Detection  
system choice





- Identification station project for  $S^3$ -LEB
- Opportunity to use it for decay spectroscopy
- Design of detection system to be settled :
  - 3D design and technical requirements
  - Ongoing GEANT4 simulation :
    - ✓ Overall geometry & detector arrangement
    - ✓ Raw response
  - Focus on Si detectors & event generator

➤ More to come !

