Optimising the characterization of an AGATA capsule in the SALSA setup by simulation

Gala González Briz

Dña. Begoña Quintana Arnés

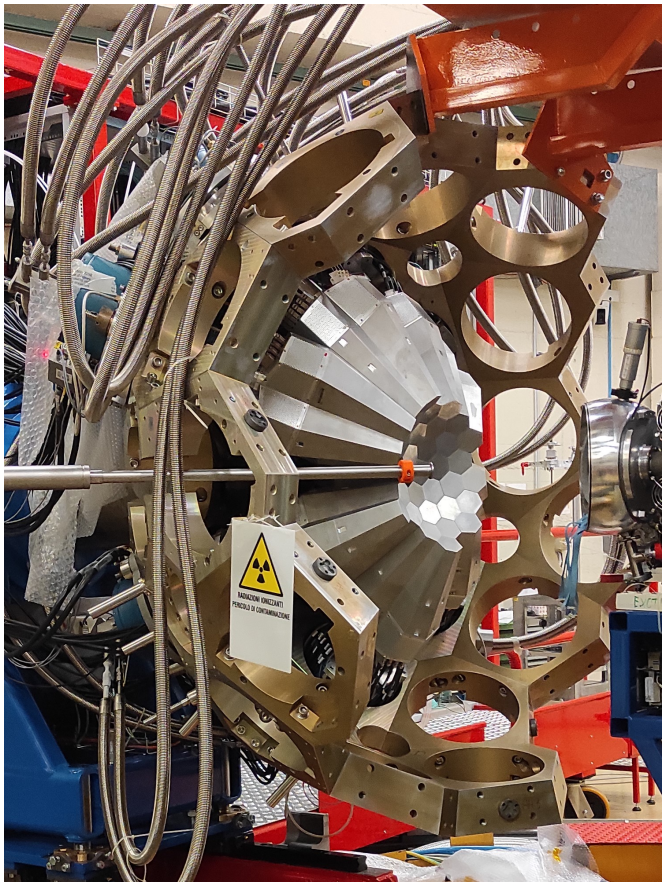
XV CPAN DAYS
2 - 6 October 2023

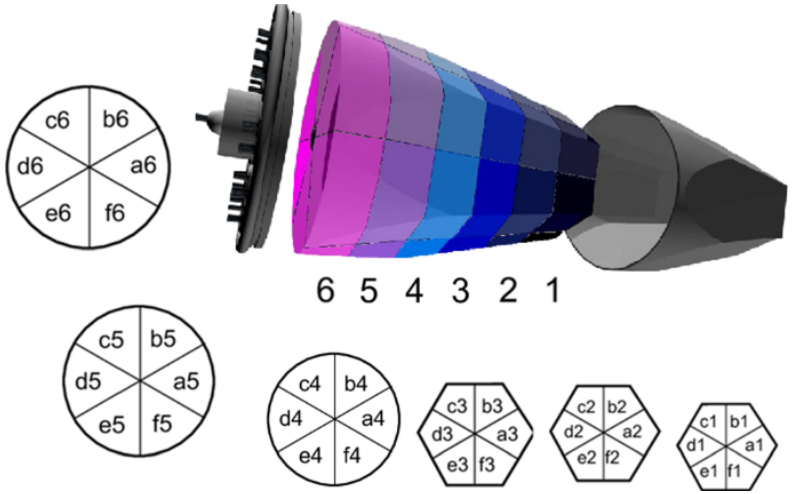
Laboratorio Datación
Radiaciones Ionizantes

Contents

Introduction

AGATA spectrometer





- 4 spectrometer.
- Position-sensitive detectors.
- Electric segmentation technology.
- Tracking to reconstruct the position.
- Efficiency and resolution improvements.

3D Scanning

SALSA setup

Building an experimental database which relates the position in the cry
with the pulse shape.

3D Scanning

SALSA setup

Position in -camera: 2D-Adjustment.

$$f(x;y) = Ae^{-\frac{1}{2}\left(\frac{(x - x_0)^2}{\sigma_x^2} + \frac{(y - y_0)^2}{\sigma_y^2}\right)}$$

Position in AGATA crystal: Tracking algorithms + time matching.

From two positions: intersection of trajectories.

Same pulse shape, same position: PSA.

3D Scanning

SALSA setup

Position in -camera: 2D-Adjustment.

Position in AGATA crystal: Tracking algorithms + time matching.

The interaction in the -camera and the position of the source provide the one in AGATA.

Time matching is performed to associate the event in AGATA crystal with its respective trajectory.

From two positions: intersection of trajectories.

Same pulse shape, same position: PSA.

3D Scanning

SALSA setup

Position in -camera: 2D-Adjustment.

Position in AGATA crystal: Tracking algorithms + time matching.

From two positions: intersection of trajectories.

The intersection of the trajectories from two di erent spatial con gurations gives the interaction point in the AGATA crystal, the sought position.

Same pulse shape, same position: PSA.

3D Scanning

SALSA setup

Position in -camera: 2D-Adjustment.

Position in AGATA crystal: Tracking algorithms + time matching.

From two positions: intersection of trajectories.

Same pulse shape, same position: PSA.

PSA techniques based on the idea that a speci c interaction position in AGATA produces a unique set of pulses in the segments. Induced signals are generated in adjoining segments.

Current work

System set-up: -camera, electronics.

Tracking algorithms and analysis software.

Simulation to optimise the scanning.

Optimization of scanning by simulation

Positions and angular distribution

N = 300000

N = 3000000

Rotation is required.

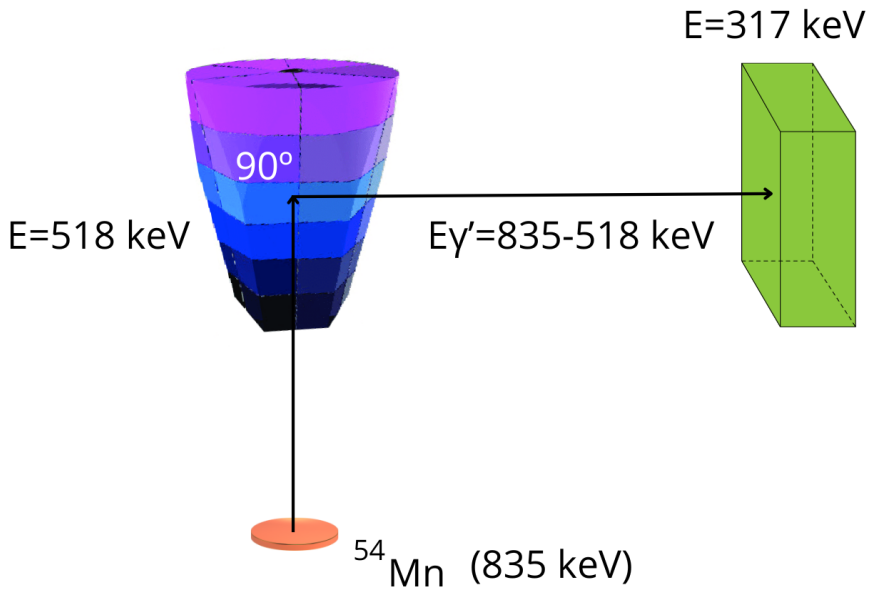
Optimization of scanning by simulation

Casuistry: number of Comptons and photoelectric processes

N = 6000000 events.
* Coincidence.
** Coincidence, 511 keV, one segment.

Future perspective

- Measuring stage, after cooling and vacuuming of the capsule.
- Development of algorithms for data analysis.
- Experiment to test the shape of the pulses in the segments when 511 keV are deposited on the AGATA detector (equivalent to photoelectric effect).



Thank you very much for your attention