



# Towards double differential cross section measurement with GSI2026 MC data

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**FOOT physics meeting** 



#### **GSI2026** experimental setup

- MC campaign GSI26PS\_MC
- ${}^{12}C / {}^{16}O$  at **700 MeV/n** impinging on a 5mm graphite target
- Highest energy reached so far with the FOOT detector, interesting for space radioprotection
- Full setup except for the CALO. At this energy, the final-state fragments will not be fully contained



### **Purpose of this work**

- Performance assessment of the whole event reconstruction chain at a limit energy for the FOOT detector
- First attempt to reconstruct **isotopic double differential cross section** (angle & energy) using MC simulated data

$$\frac{d^2 \sigma(A, Z, \theta, E)}{d\Omega \, dE} = \frac{Y(A, Z, \theta, E)}{N_{\text{beam}} \, N_t \, \epsilon(A, Z, \theta, E) \, \Delta E \, \Delta \Omega(\theta)}$$

## **Tools and strategy**

The cross section measurement will be carried out using **G. Ubaldi's analysis framework** in SHOE (*GlobalAna* class), a powerful tool based on ROOT RDataFrame to optimize the execution



Fill flat trees with the previous containers

Process data of flat trees to obtain a cross section

- The framework, initially developed for GSI2021 campaign, needs to be adapted to 700 MeV/n beams
- Double-differential cross sections will require an estimation of yields and efficiencies in terms of energy, as well as a binning in energy
- This work will be carried out with the help and collaboration of G. Ubaldi and M. Toppi

#### Thanks!