Università
degli Studi
della Campania
Luigi Vanvitelli

Dipartimento di Matematica e Fisica

Direct measurements at CIRCE

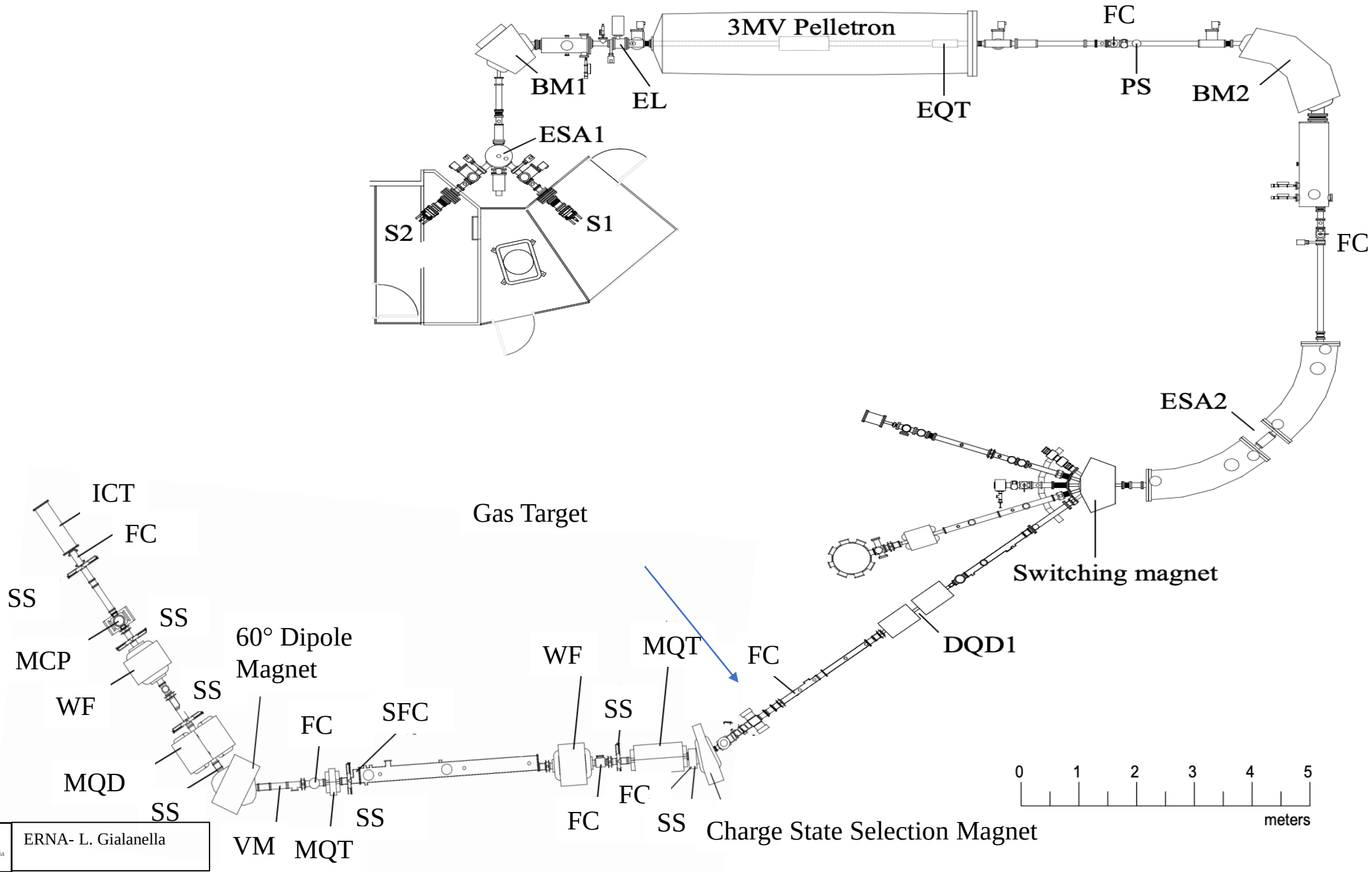
L. Gialanella - University of Campania, Caserta, Italy
for the ERNA collaboration

13th Torino Workshop and 3rd Perugia workshop on NA, Perugia 19-24 June 2022

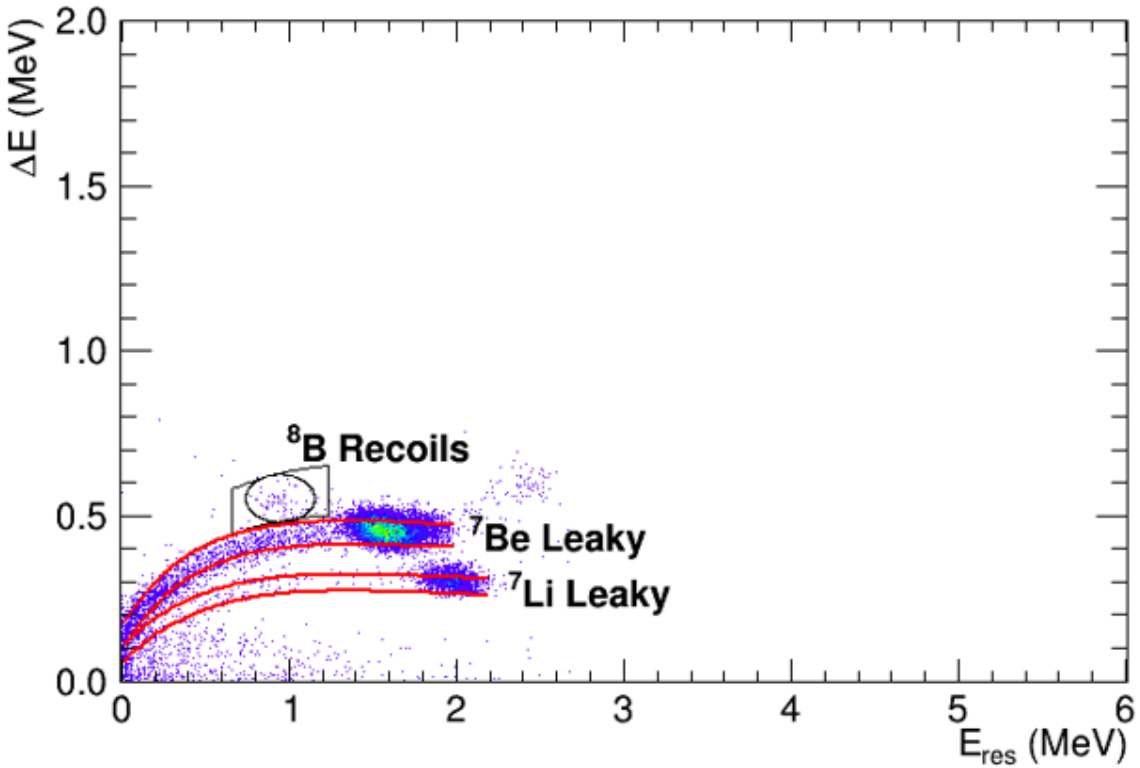
INFN
Istituto Nazionale di Fisica Nucleare

Recent achievements of the ERNA collaboration

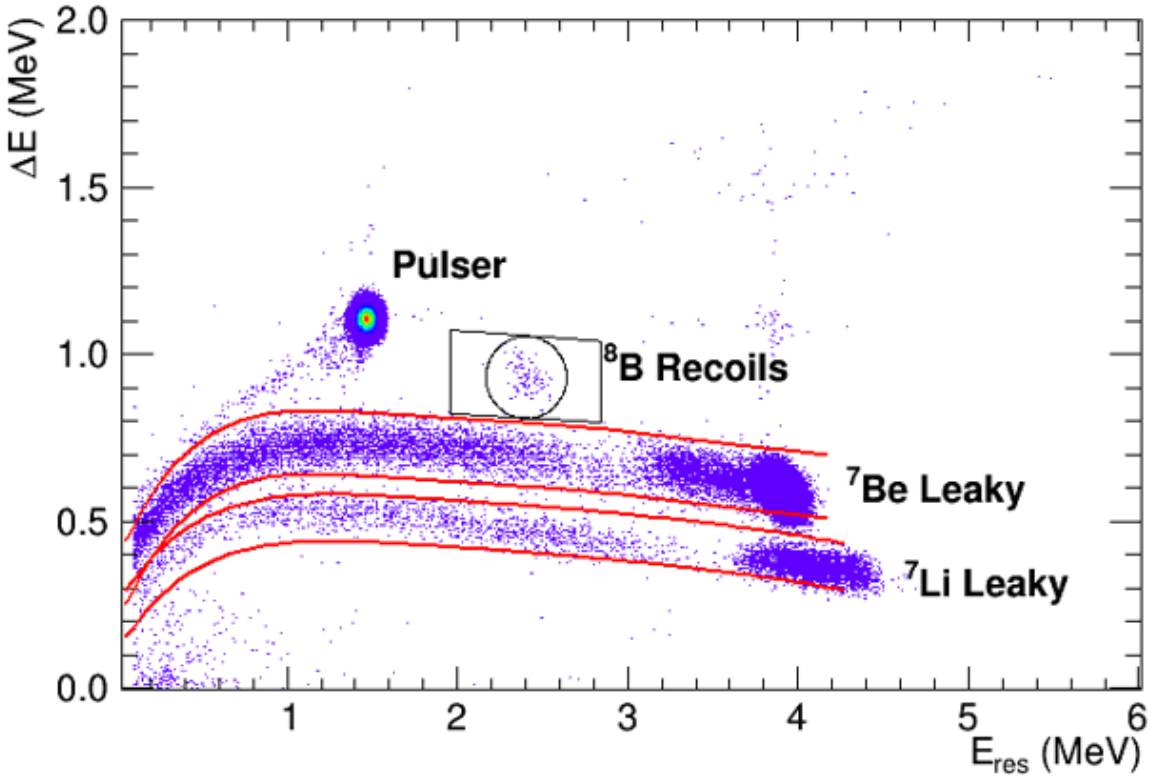
Tandem Accelerator Laboratory, Dept. of Mathematics and Physics, University of Campania, Caserta, Italy


3MV Pelletron
FC
BM1
EL
EQT
PS
BM2
ESA1
S2
S1
FC
ESA2
ICT
FC
Gas Target
SS
SS
Switching magnet
60° Dipole
Magnet
MCP
WF
SS
WF
MQT
FC
DQD1
SFC
FC
SS
MQD
FC
SS
SS
FC
SS
0
1
2
3
4
5
meters
VM
MQT
Charge State Selection Magnet

More recent measurement completed: $^{7}Be(p,\gamma)^{8}B$

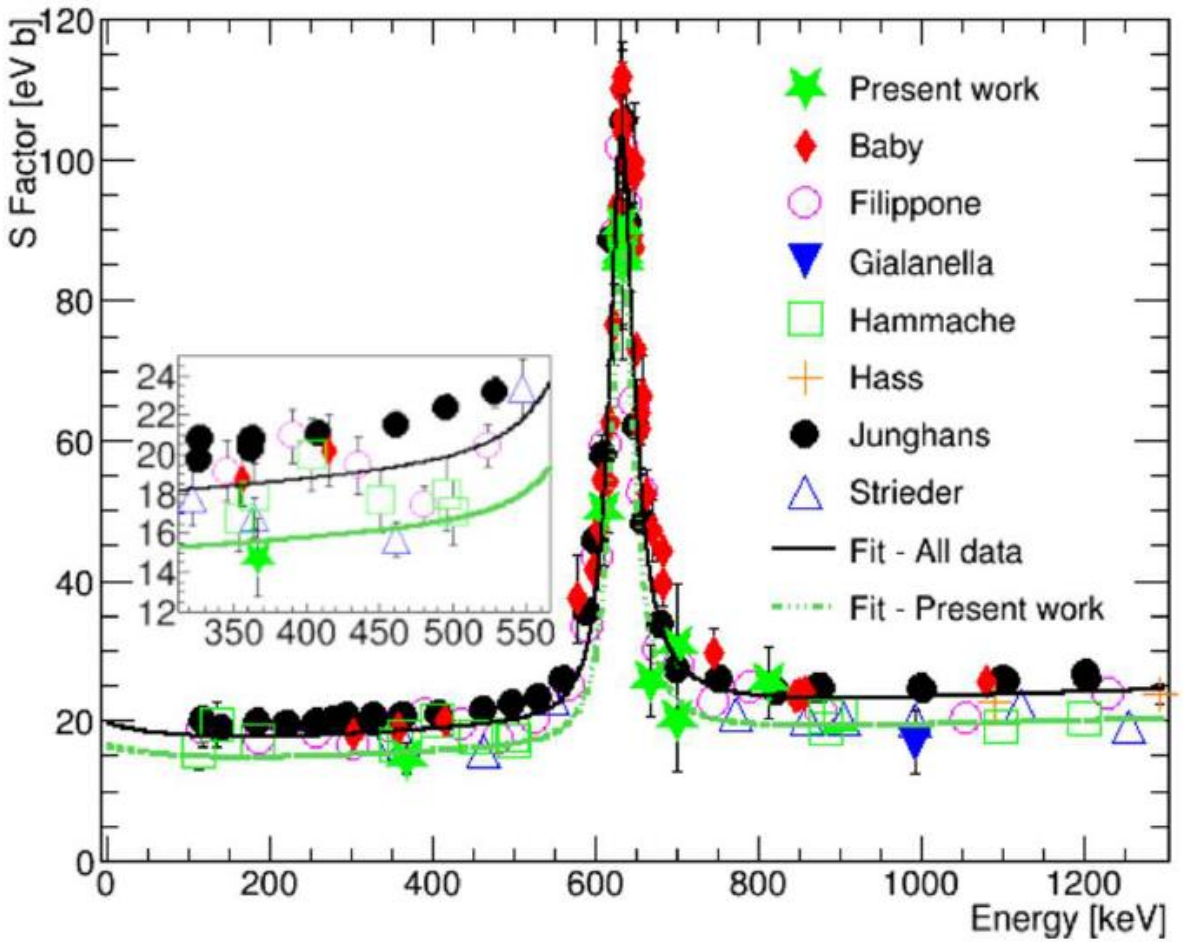


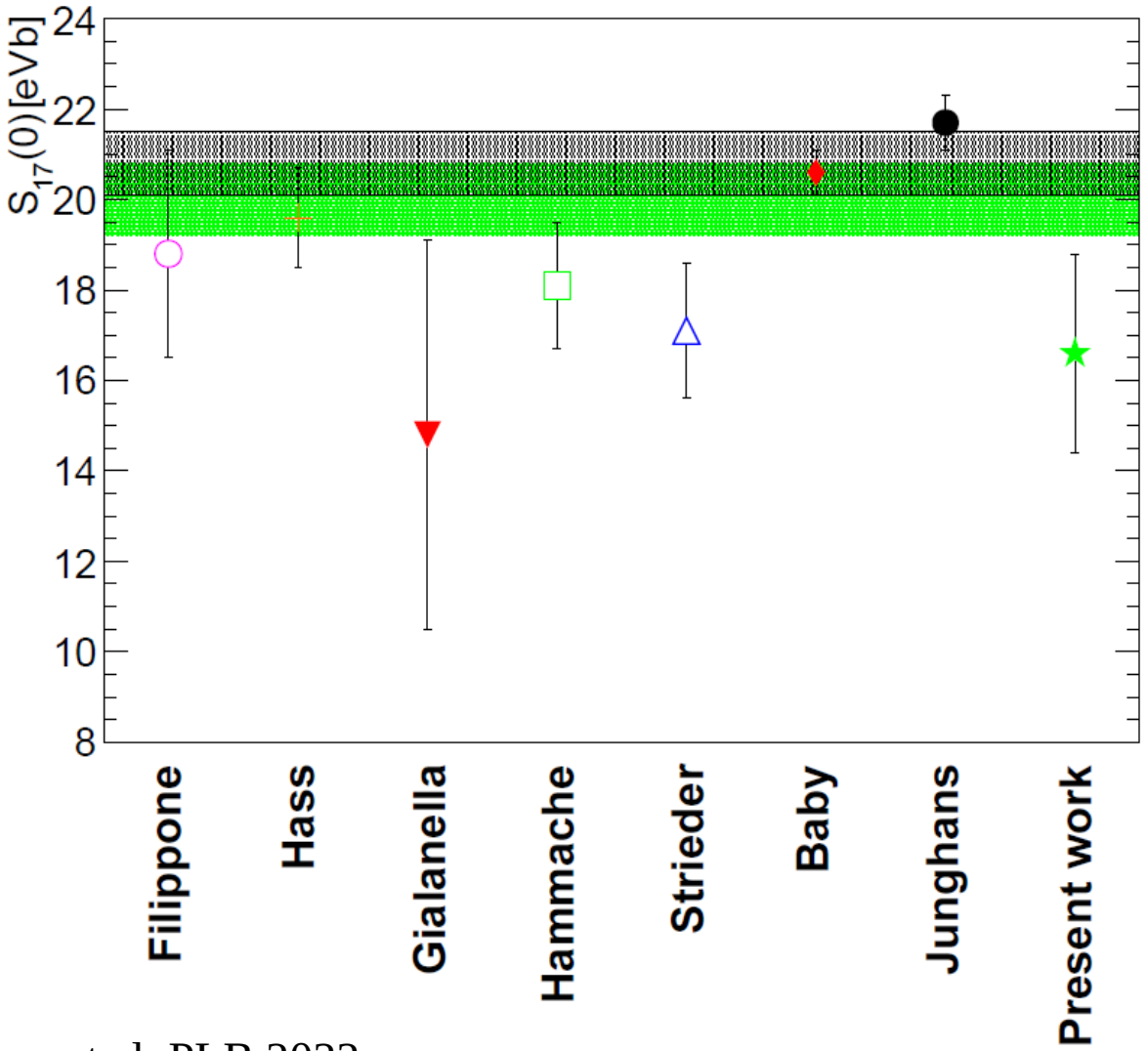
E=367 keV



E=632 keV

More recent measurement completed: $^{7}Be(p,\gamma)^{8}B$

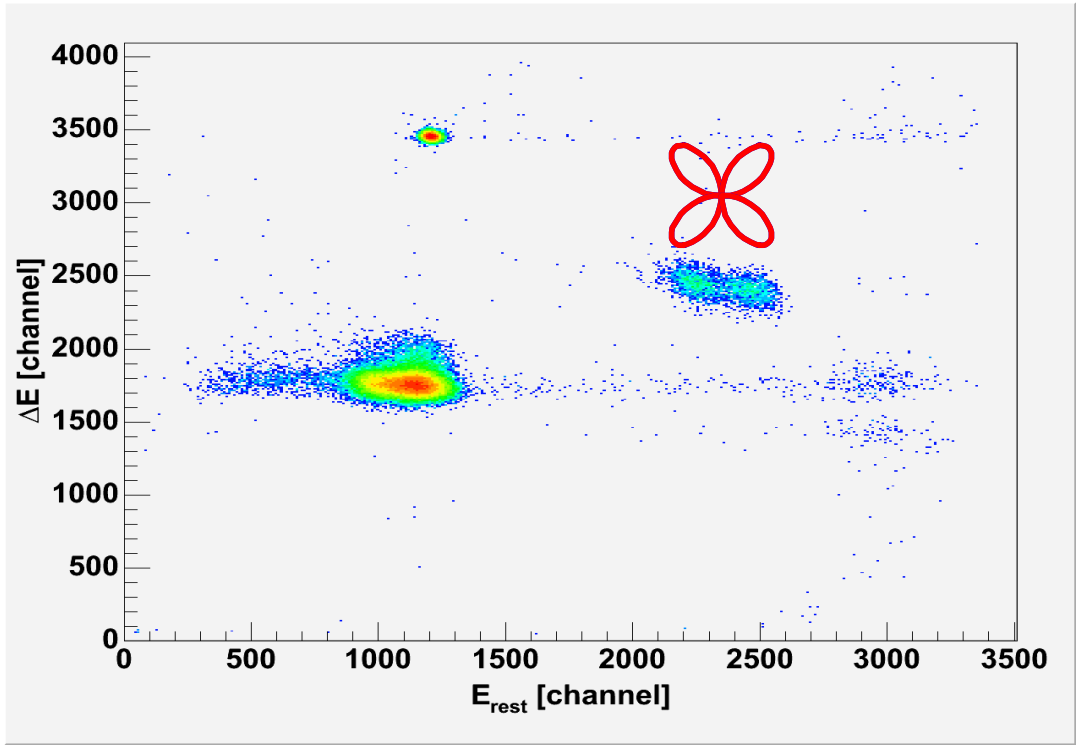


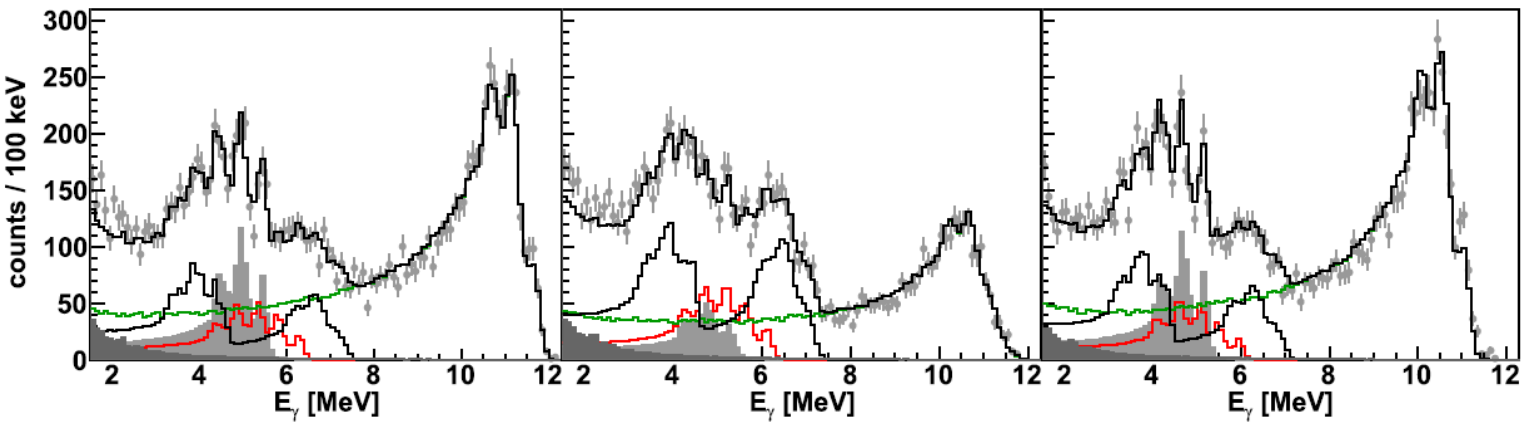


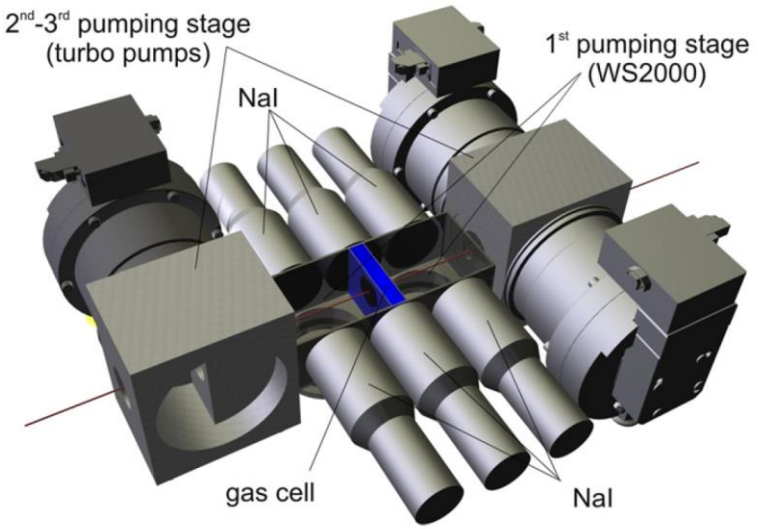
Buompane et al, PLB 2022

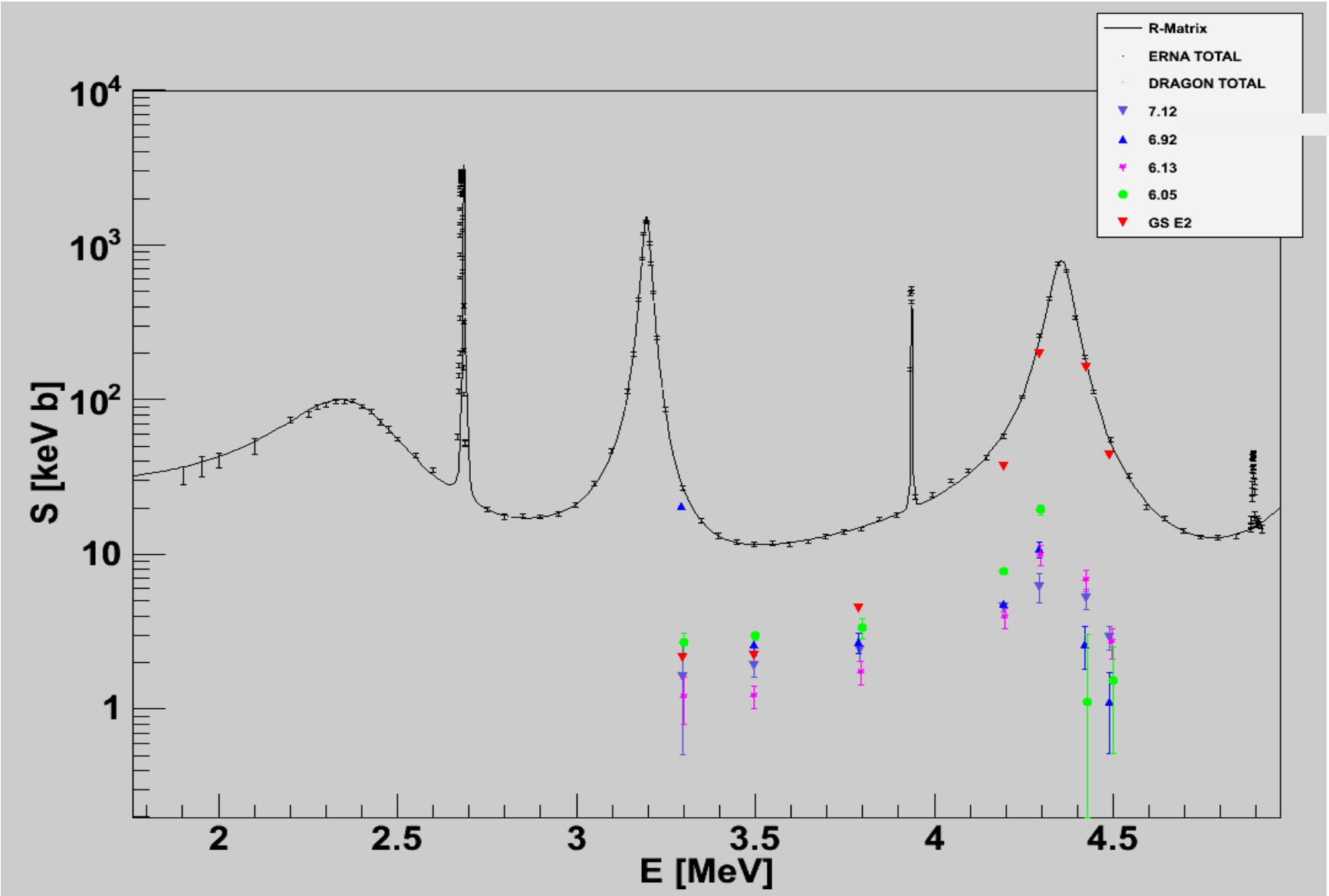
- for ERNA data on $^{15}N(\alpha,\gamma)^{19}F$ see Di Leva et al PRC 2017

Next case: $^{12}C(\alpha,\gamma)^{16}O$



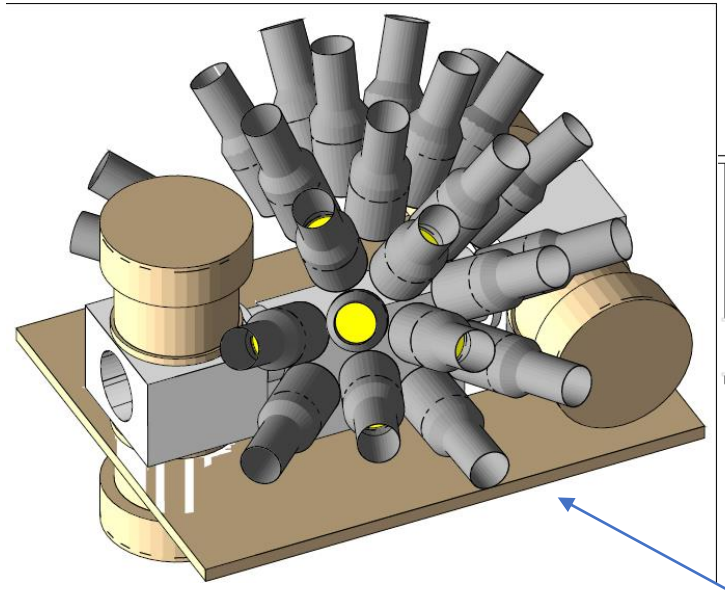






Schuermann et al, EPJA 2005, PLB 2011

- for an extensive review on $^{12}C(\alpha,\gamma)^{16}O$ see De Boer at al RMP 2017



3MV Pelletron
BM1
EL
EQT
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DQD1
ICT
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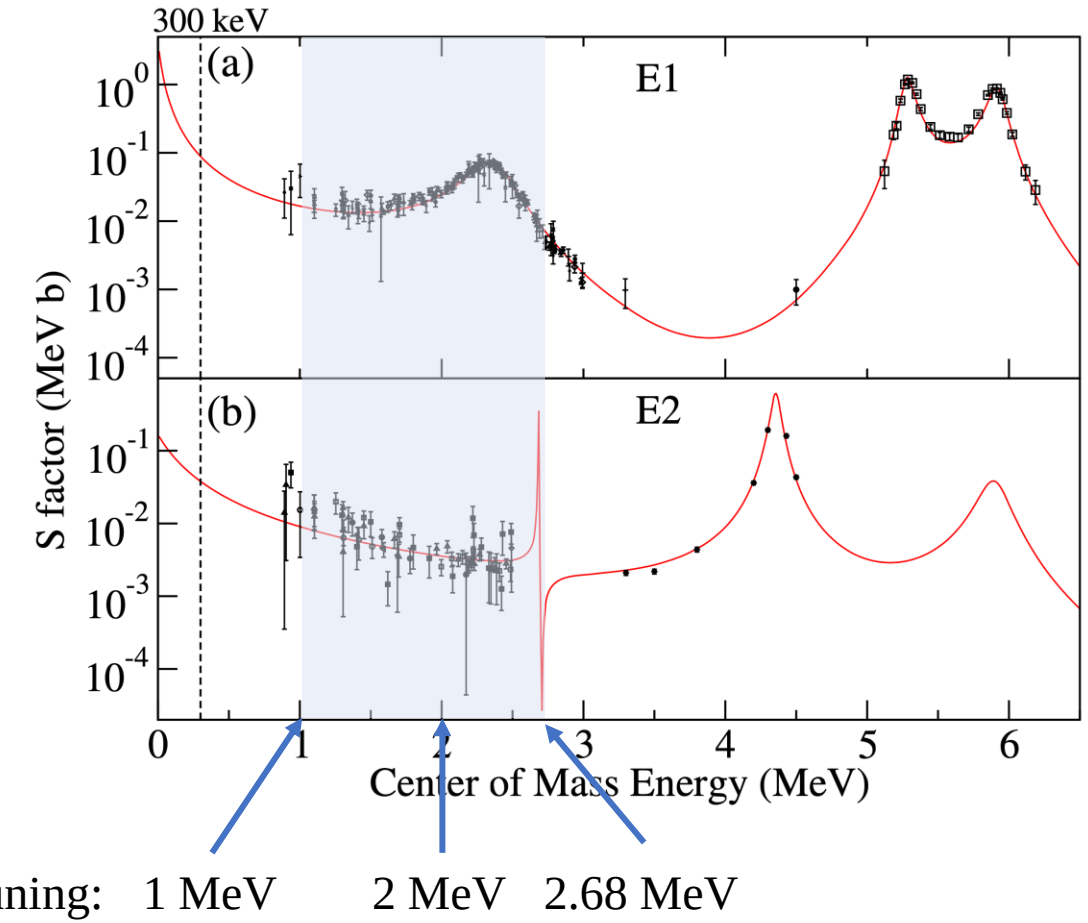
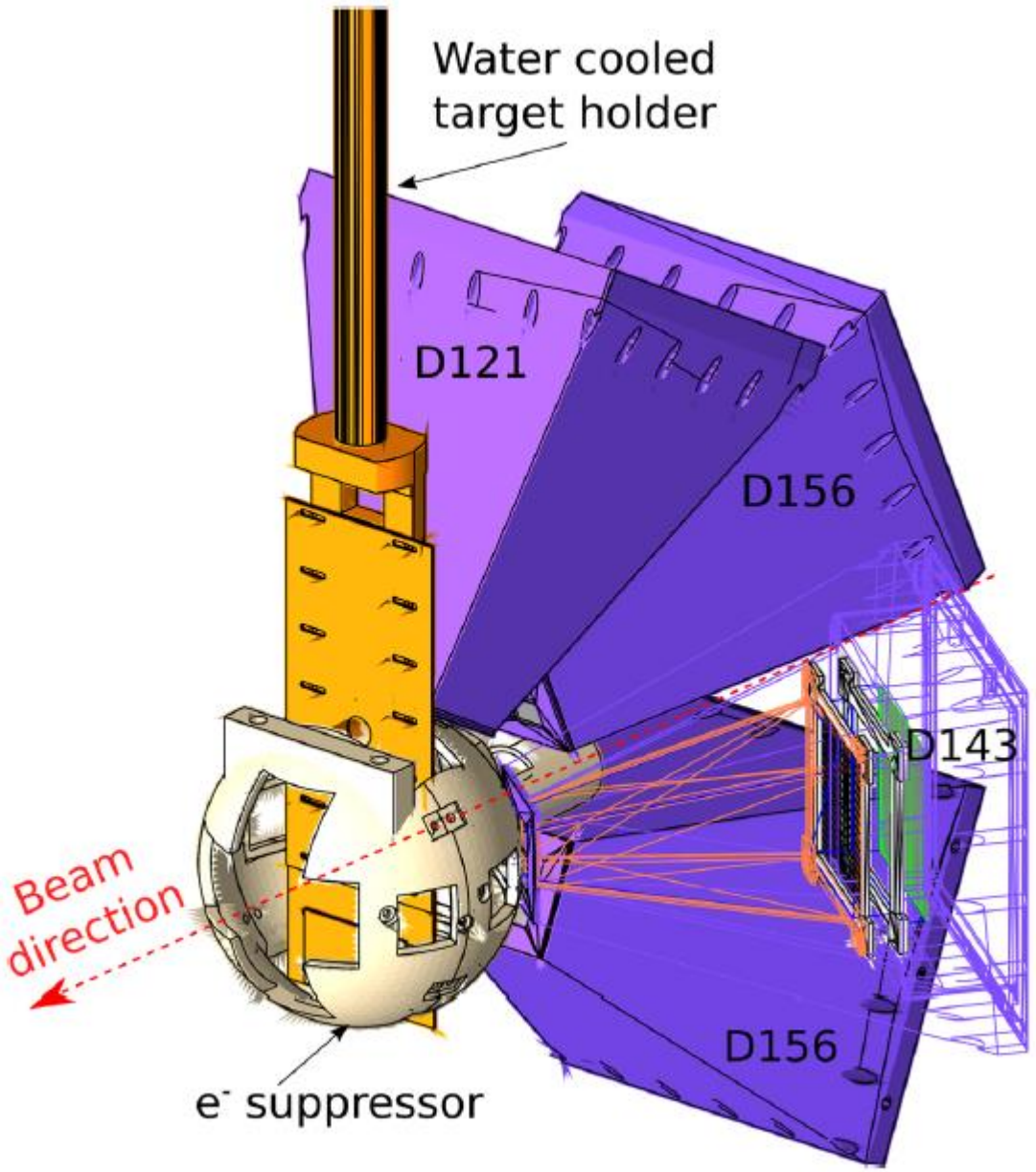
SS
SS
MCP
WF
SS
60° Dipole Magnet
MQD
SS
VM
MQT
SS
FC
SFC
Gas Jet Target +
γ ray detectors
WF
MQT
FC
SS
FC
FC
SS
Charge State Selection Magnet
0 1 2 3 4 5
meters

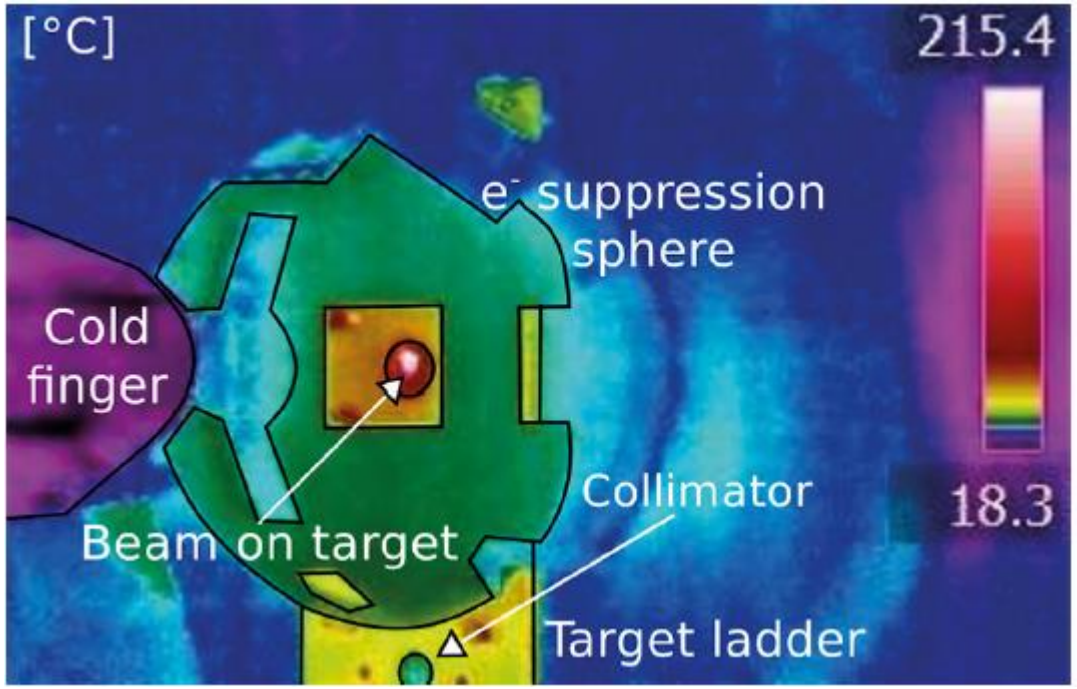
Experimental program

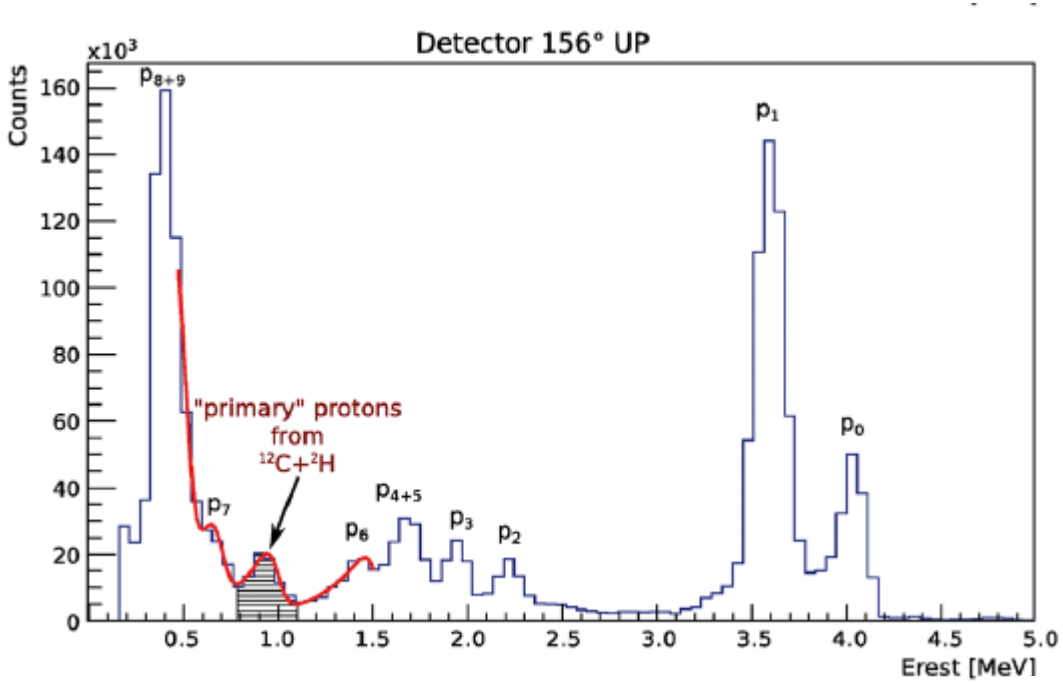
- Cross section measurements down to E_{cm}=1.0 MeV
- Resonance studies at E_{cm} =2.2 and 2.68 MeV

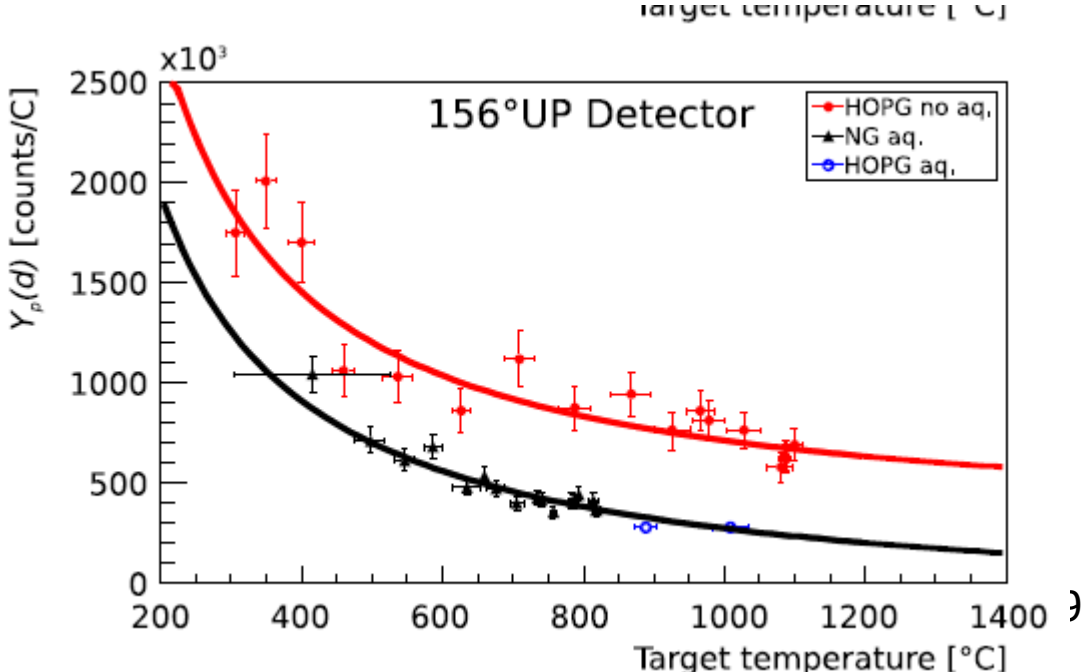


Particle spectroscopy: $^{12}C+ ^{12}C$

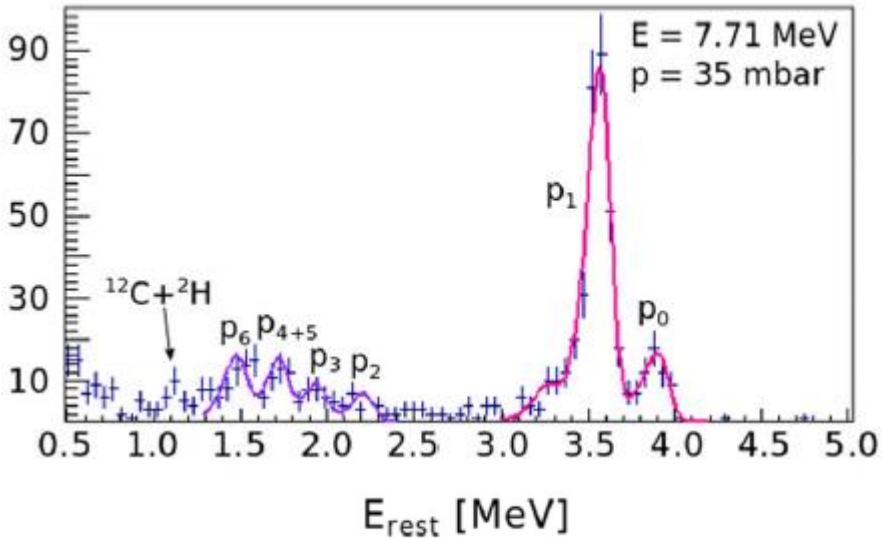


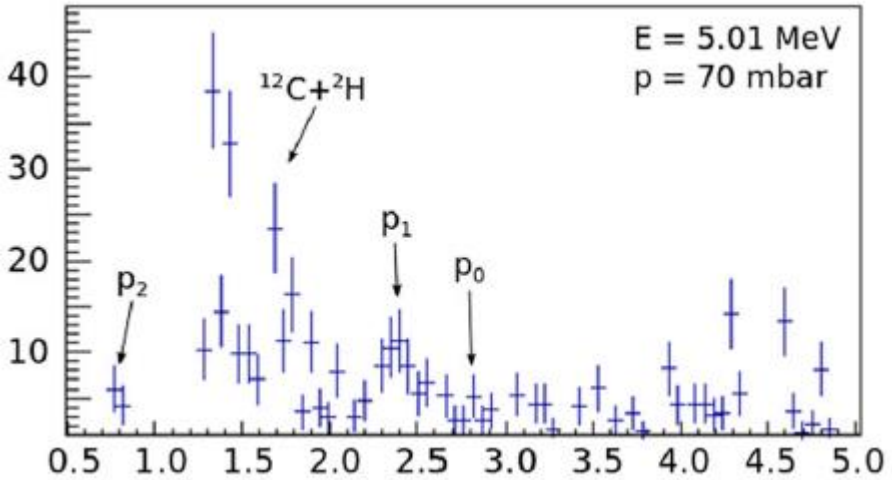


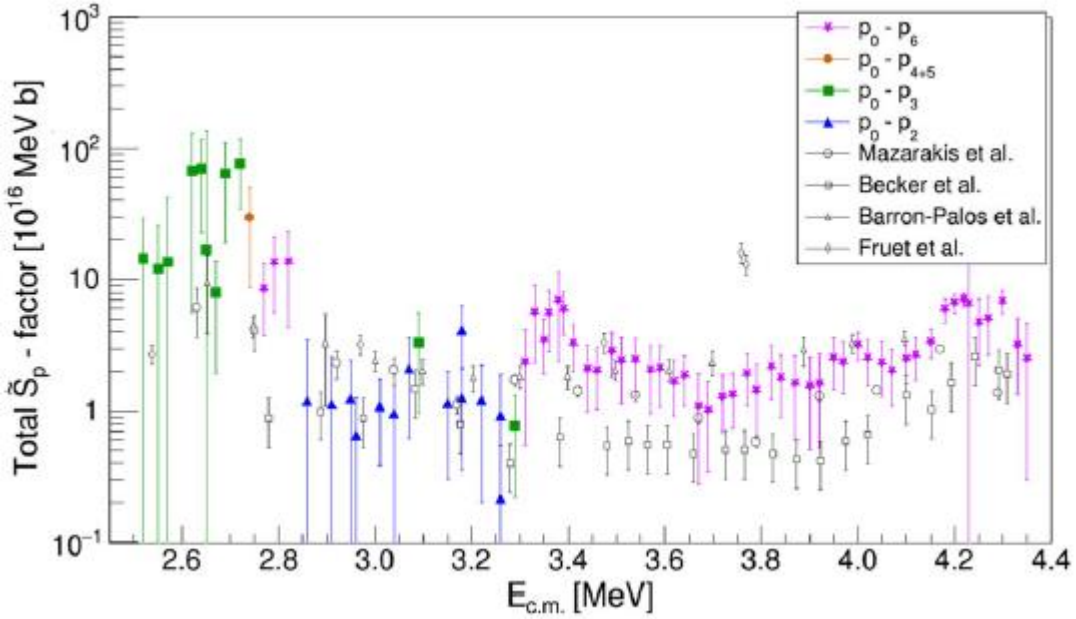


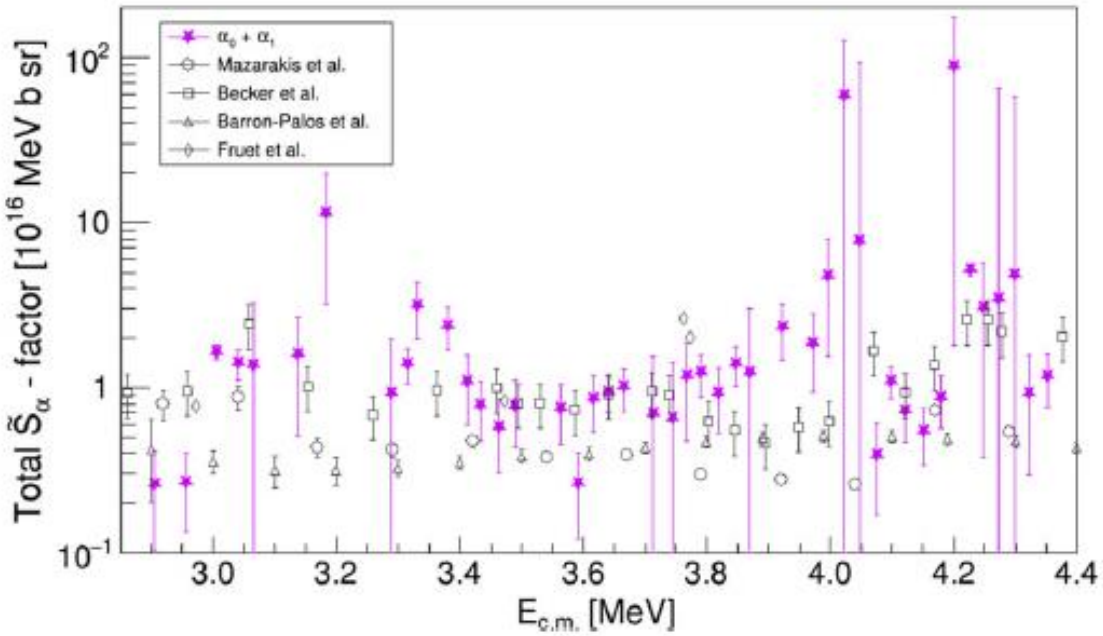


L. Morales-Gallegos et al
Eur. Phys. J. A (2018) 54: 132


E = 7.71 MeV
p = 35 mbar
$^{12}C+^{2}H$
p_6 p_{4+5}
p_3 p_2
p_1
p_0
90
70
50
30
10
0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
E_{rest} [MeV]


E = 5.01 MeV
p = 70 mbar
$^{12}C+^{2}H$
p_2
p_1
p_0
40
30
20
10
0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0





L. Morales-Gallegos et al

Eur. Phys. J. A (2022) 58:65

Next to come AsBeST: A 7-Beryllium electron capture STudy for nuclear and solid state physics (ASBeST)

Collaboration: Department of Mathematics and Physics University of Campania, CNR-IMM (BO), INFN (Roma, LNGS), Electronic Engineering Department University of Salerno

1. Inflight decay

2. Decay in a solid state environemt

1.

Inflight decay

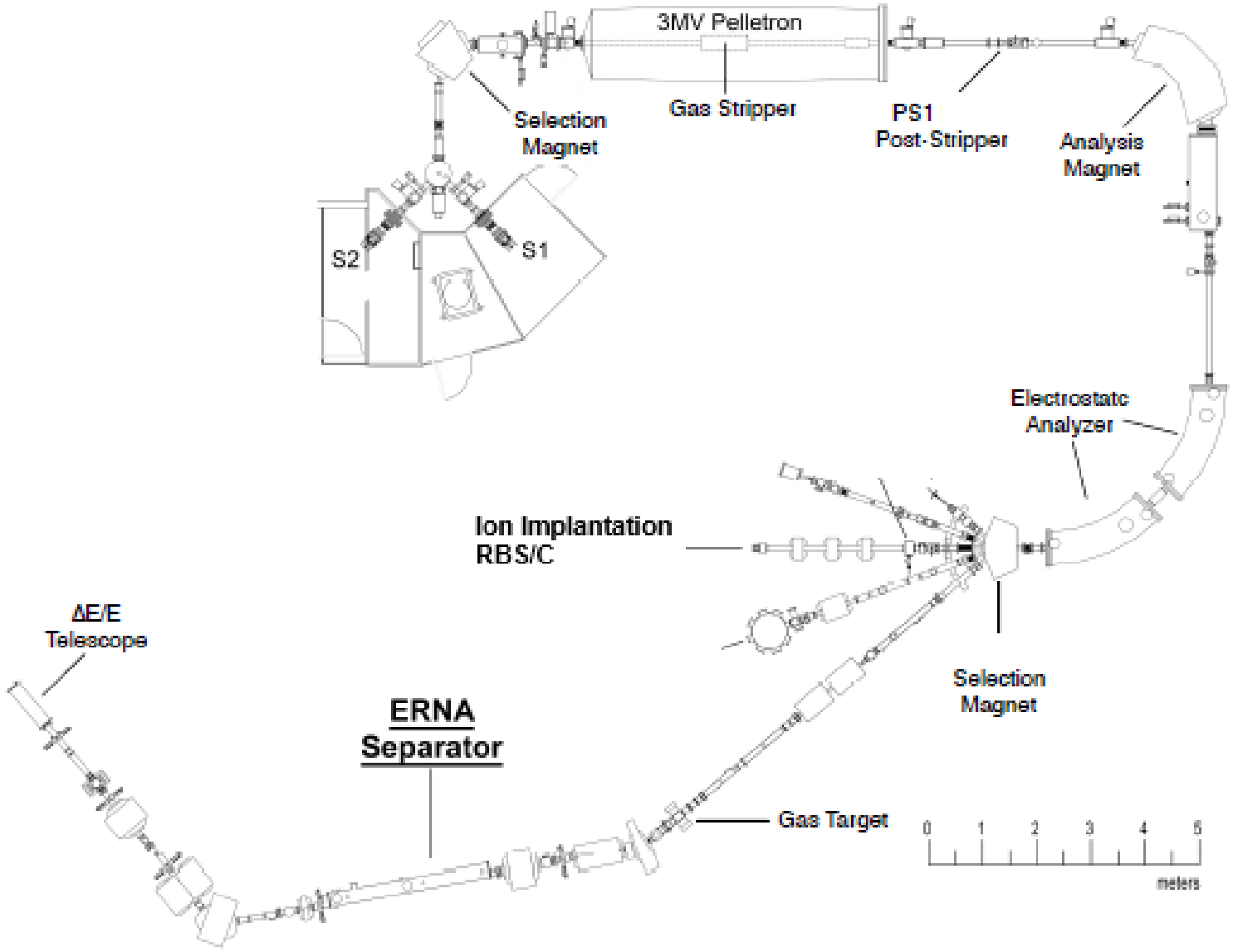


Fig. WP1.1.1 Layout of the Pelletron Tandem Accelerator facility at CIRCE.

1.

Inflight decay

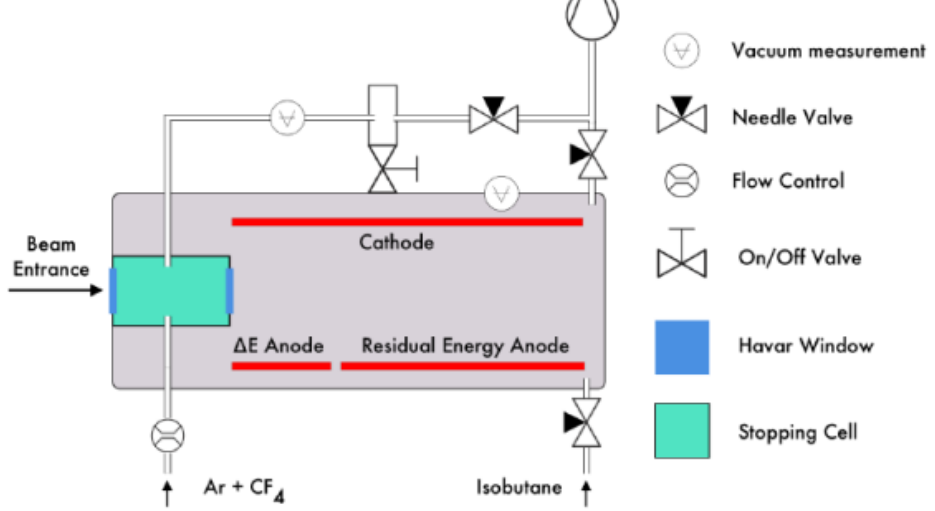
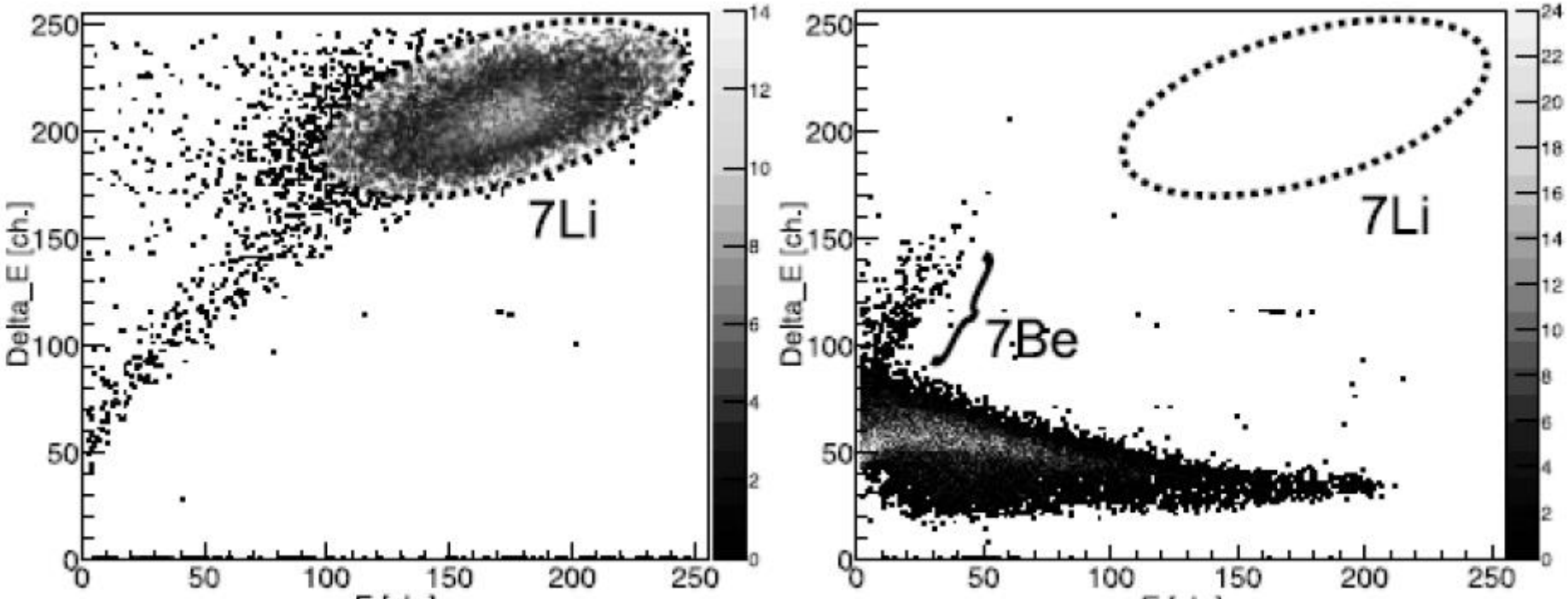
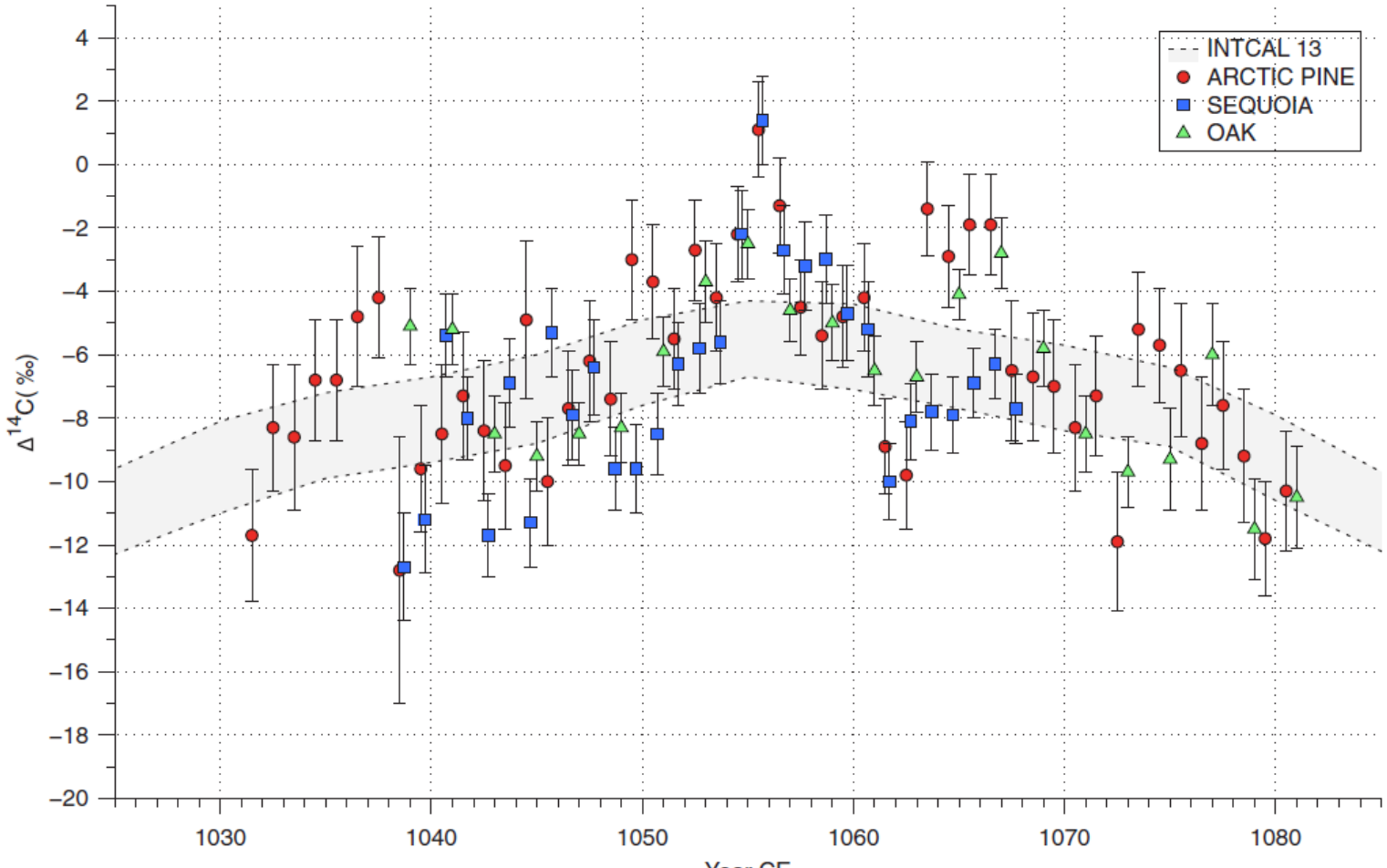


Fig WP1.2.1 Scheme of the setup of the Ionization Chamber with the additional cell.



Radiocarbon, Vol 62, Nr 5, 2020, p 1403–1418 DOI:10.1017/RDC.2020.58

CAN THE ^{14}C PRODUCTION IN 1055 CE BE AFFECTED BY SN1054?



Two calls for Post-doc positions are opening soon

contact person: lucio.gialanella@unicampania.it