

The OREO (ORiEnted calOrimeter) project

Alessia Selmi

aselmi@uninsubria.it

On behalf of the OREO collaboration



Riunione NA62 Italia

LNF - Frascati, Nov. 7-8, 2024

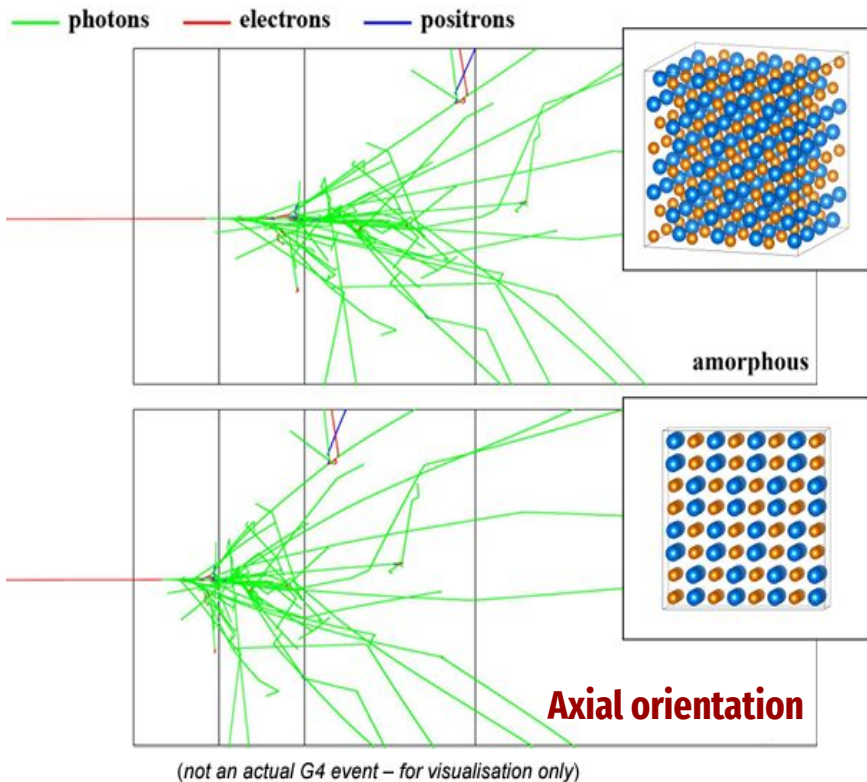


MiB - Ferrara
LNL - LNF





Orienting an electromagnetic calorimeter!



**Acceleration of the
electromagnetic shower
development [1][2][3]**

Reduction of the effective radiation length X_0 ,
whereas λ_{int} (hadronic) is unaffected

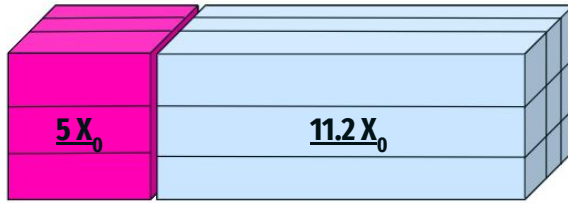
Improved γ /hadron discrimination [4]

2024

OREO - ORiEnted calOrimeter

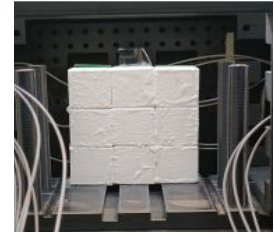


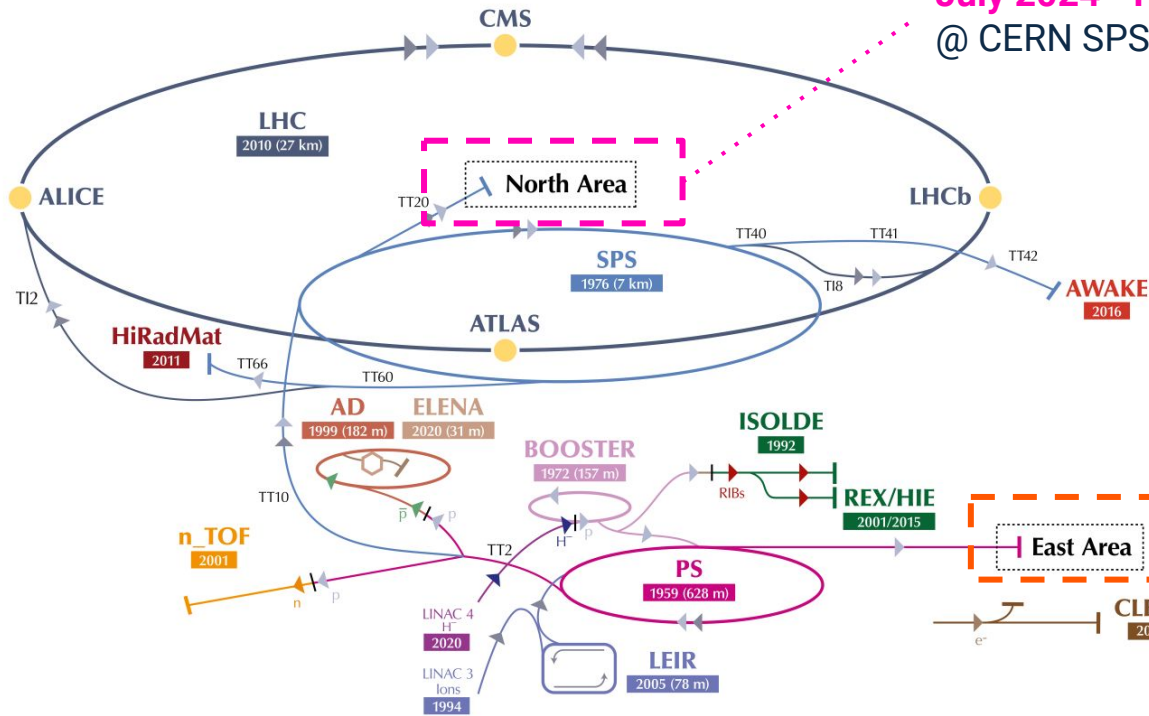
CSN5
Ricerca
Tecnologica



3x3 matrix of **oriented PbWO₄ Ultra Fast**
readout by SiPMs with:

- An **oriented layer of 5 X₀**
- A non oriented layer of 11.2 X₀





July 2024 - H4 beam line
@ CERN SPS, North Area



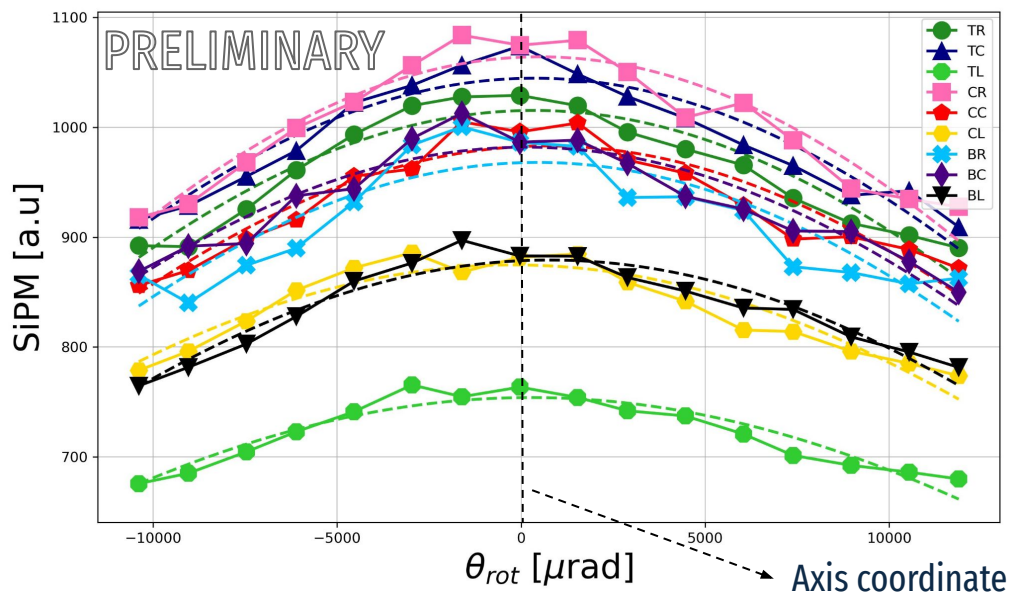
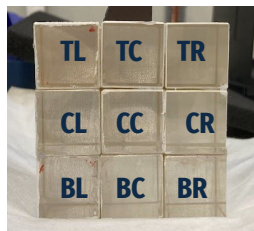
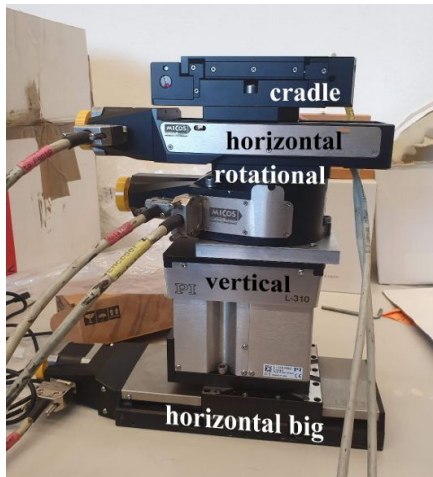
June 2024 - T9 beam line
@ CERN PS, East Area



Preliminary results @ T9 CERN PS



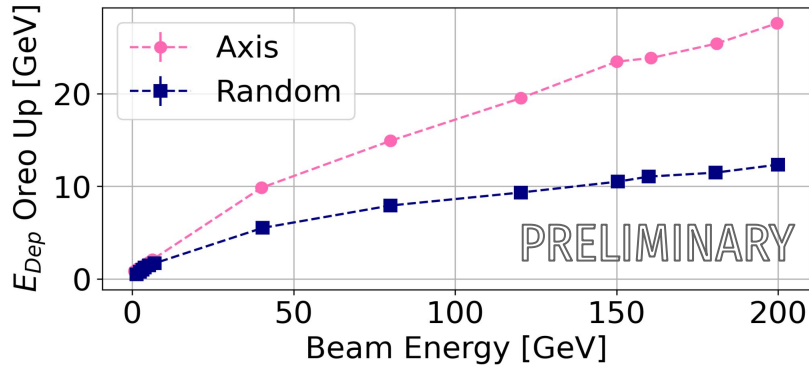
Goniometer



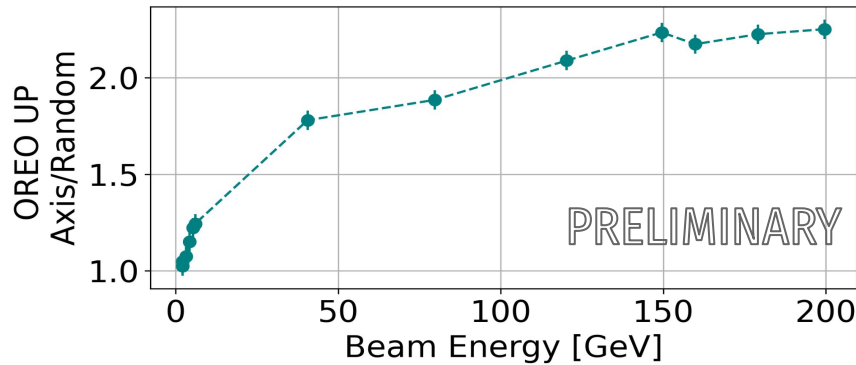
The crystals are well inter-aligned! 👍

Preliminary results @ T9 CERN PS and H4 CERN SPS

Energy deposited in the $5X_0$ oriented layer

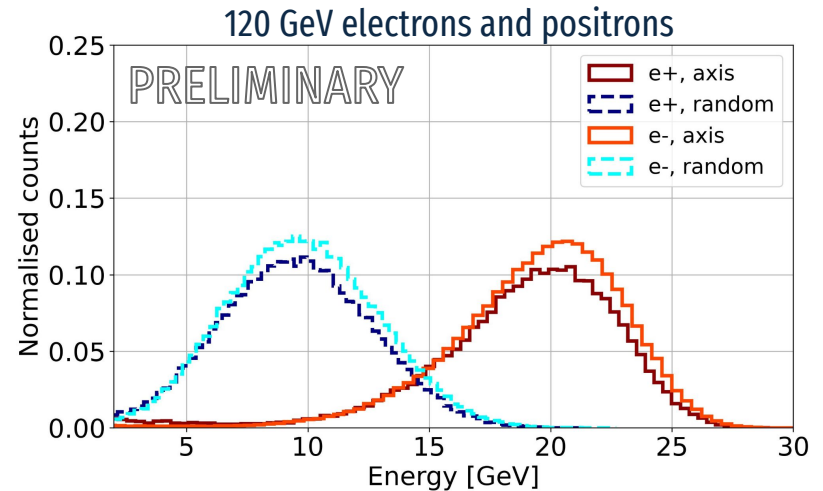


Acceleration of the electromagnetic shower



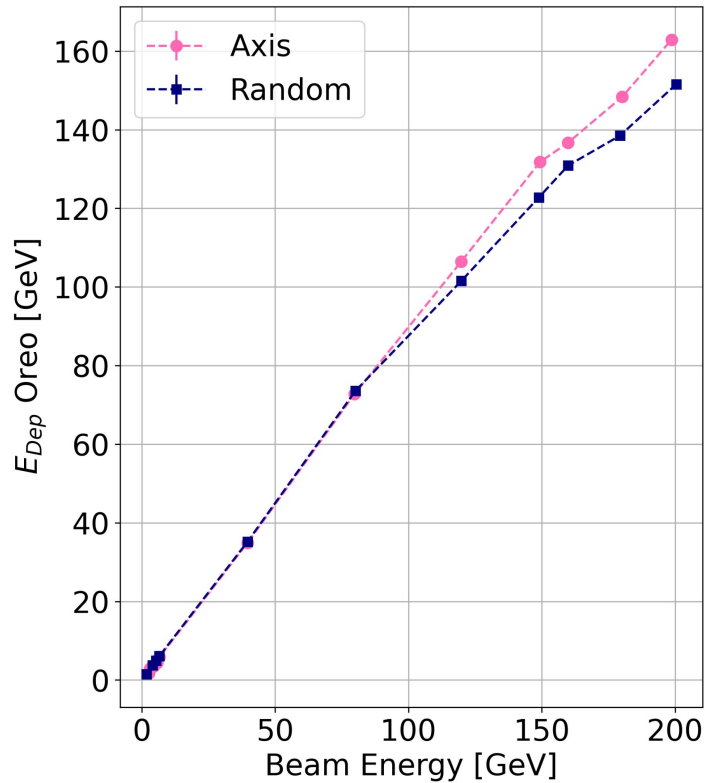
T9

H4

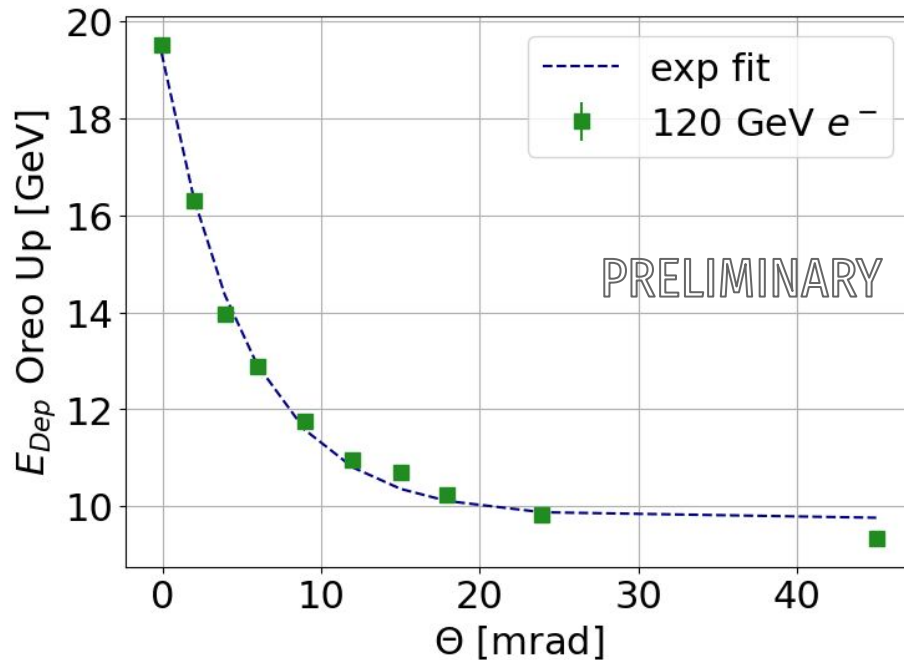




Preliminary results @ T9 CERN PS and H4 CERN SPS: Energy deposited in OREO



Preliminary results: angular range



$$\Theta_0 = \frac{U_0}{mc^2} \longrightarrow \text{For PbWO}_4 \text{ axis } \langle 001 \rangle$$

$\Theta_0 \sim 0.82 \text{ mrad}$

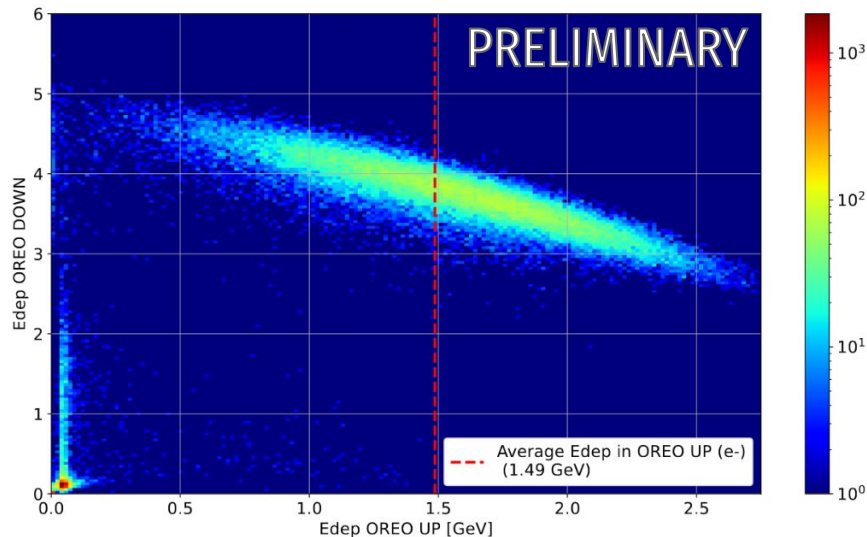
Acceleration in the e.m. shower development is visible **for an incident angle Θ up to 1° (17 mrad)**



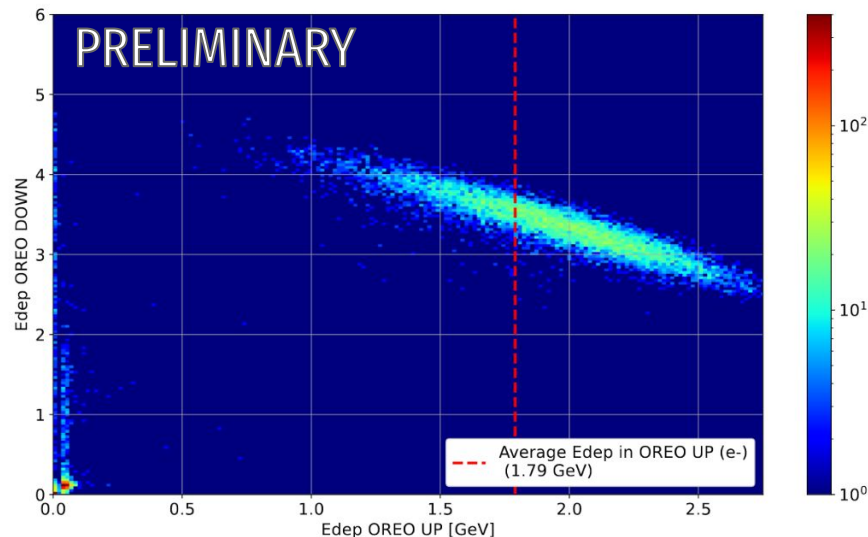
electrons / hadrons discrimination

6 GeV mixed beam, T9 beamline @ CERN PS

RANDOM



AXIAL



The axial strong field modifies only the electromagnetic processes:
the hadrons are unaffected by the lattice orientation.

