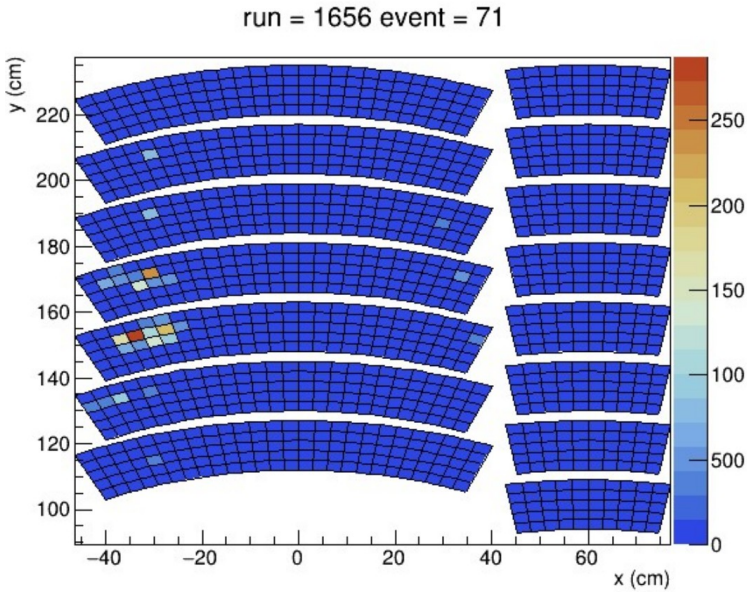
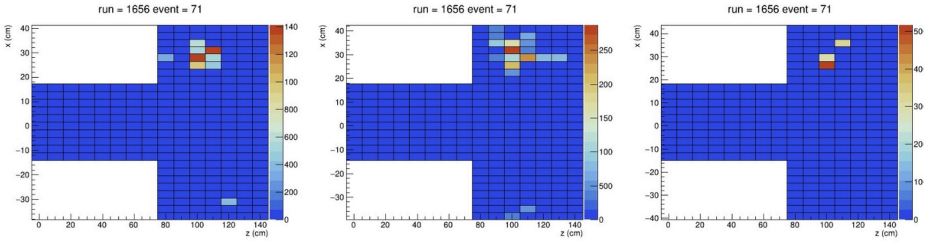
ENUBET/NP06

PS/SPS user meeting
CERN, 15 Aug 2024

A. Longhin (Univ. Padova & INFN)
for the ENUBET Coll.





This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 681647).

Transportation, handling logistics

14 Aug 2024

A big thank you to the logistics team for help with the installation and for having the detector quickly transferred from Prevessins yesterday despite some flaws in the original EDH request.

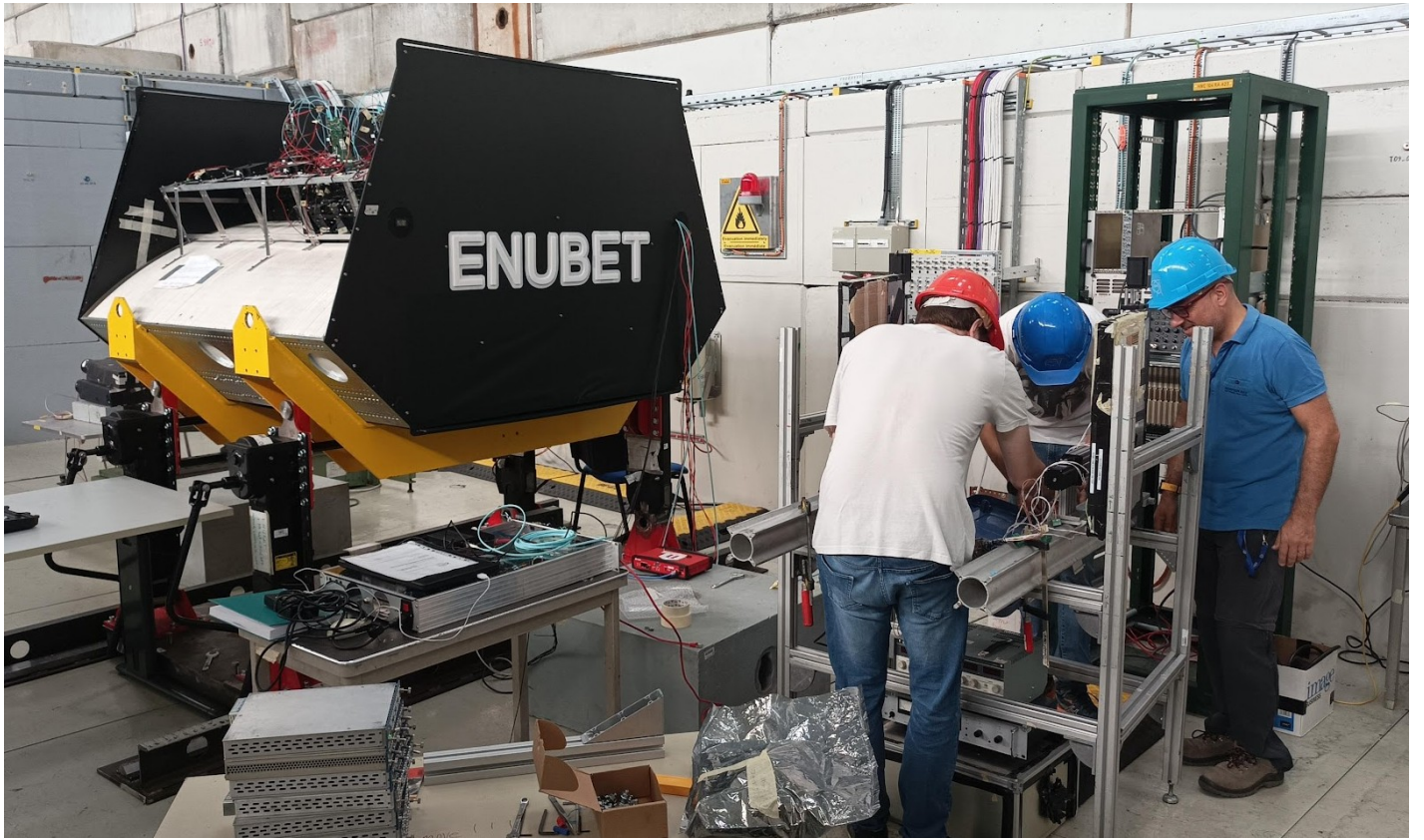
Installation

15 August 9.20

The detector installation is almost finalized. We plan to complete it this morning. **Safety visit is planned for today @ 16.00**

Setup is similar to last year but with:

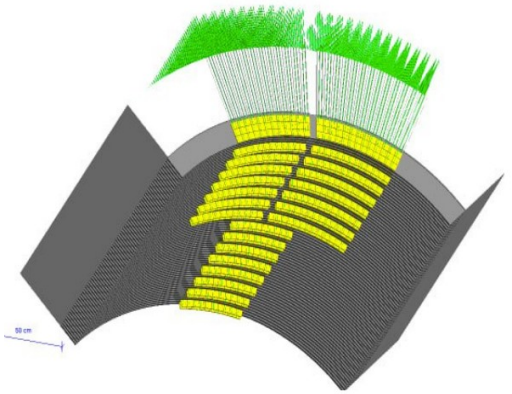
- An upgraded **DAQ** with optical link board synchronization
- A more compact and elegant **darkening box**
- **PICOSEC MicroMegas** test for hadron dump instrumentation (this will come towards the end of the test – more news next week)

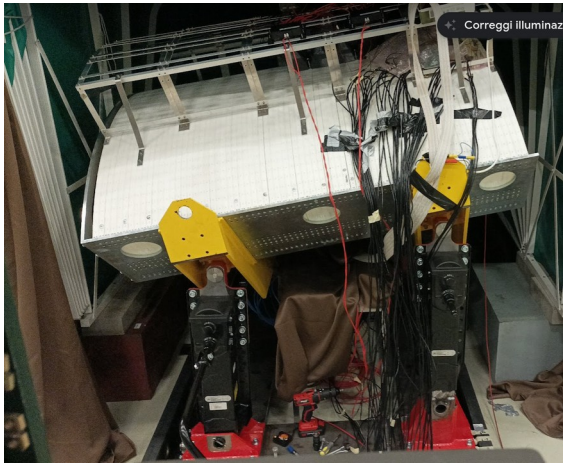


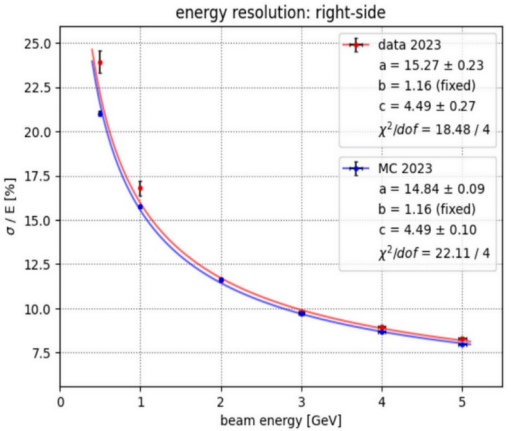
Plans

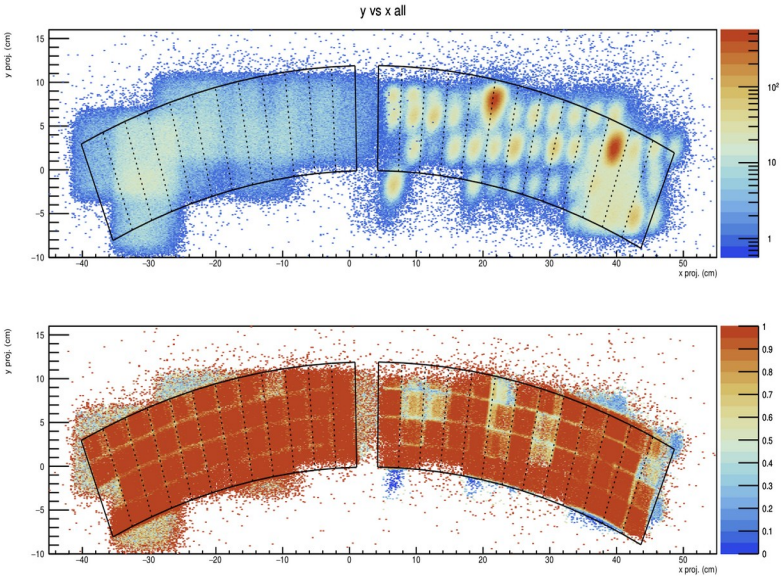
Run with mixed beam (hadrons, muons, electrons) and “pure” electrons settings. No change wrt last year. We can use the same magnet configurations.

Test uniformity, energy resolution, particle identification, effect of beam tilt.



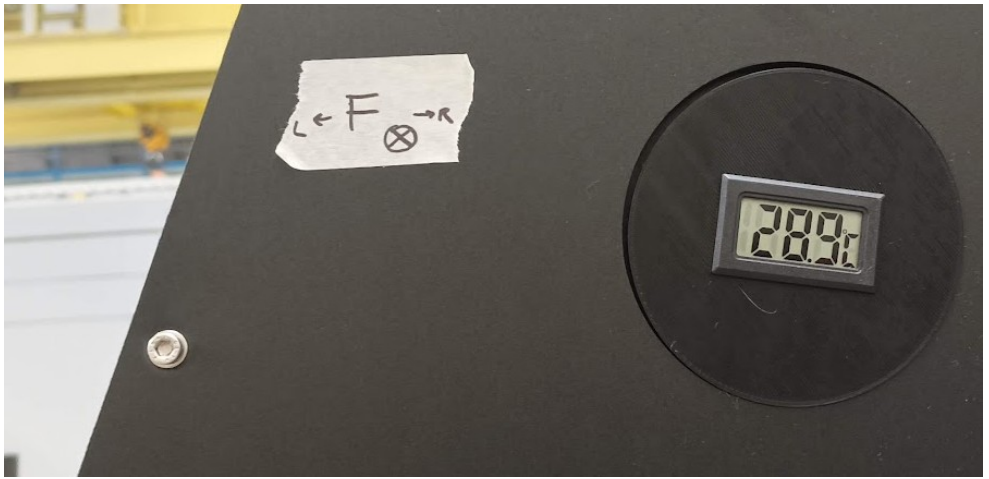






Final remarks

It is quite hard to work in T9 due to the high temperature (~30 °C) and humidity (helmets, long trousers), maybe it is exceptional but is there any possibility to improve this ?



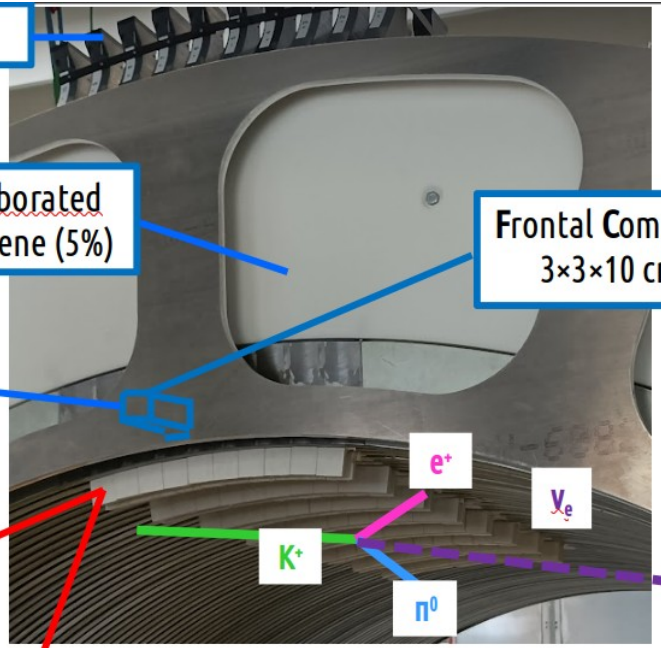
Backup

The lepton tagger

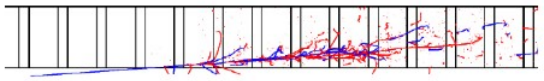
Light r/o (SiPM)

30 cm of borated polyethylene (5%)

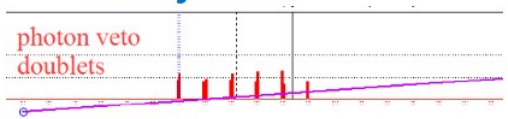
Frontal Compact Module
3×3×10 cm³ – 4.3 X_0

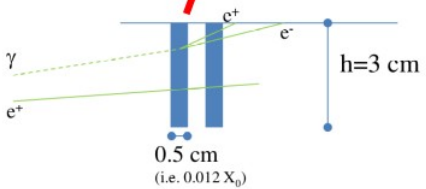


Calorimeter
Longitudinal segmentation
Plastic scintillator + Iron absorbers
Integrated light readout with SiPM
→ e⁺/π±/μ separation



Integrated photon veto
Plastic scintillators rings of 3×3 cm² pads
→ π⁰ rejection





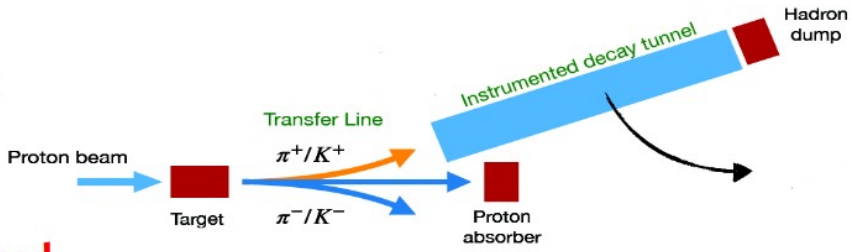
e⁺ (signal) topology

π⁰ (background) topology

π⁺ (background) topology

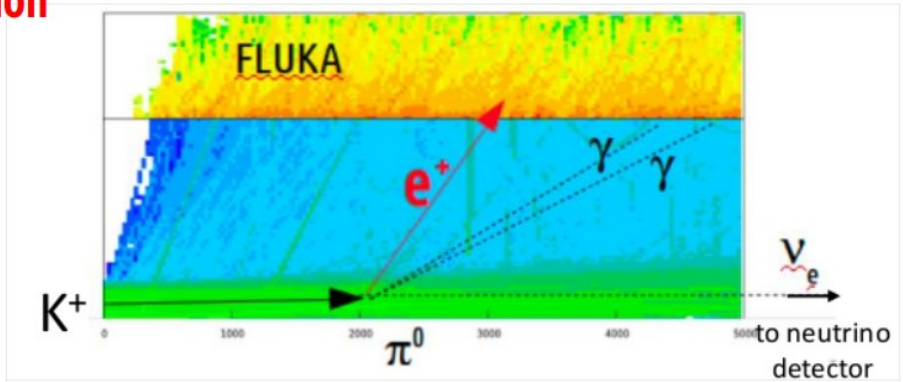
Monitored neutrino beams

ENUBET the first **"monitored neutrino beam":**



the production of neutrino-associated leptons is monitored at single particle level in an instrumented decay region

- **Instrumented decay region**
  $K^+ \rightarrow e^+ \nu_e \pi^0 \rightarrow$ (large angle) e^+
  $K^+ \rightarrow \mu^+ \nu_\mu \pi^0$ or $\rightarrow \mu^+ \nu_\mu \rightarrow$ (large angle) μ^+
- **ν_e and ν_μ flux prediction from e^+/μ^+ rates**



- Needs a **collimated momentum-selected hadron beam** → **only the decay products hit the tagger**
  → manageable rates and irradiation in the detectors
- Needs a **"short", 40 m, decay region** : ~all ν_e from K, only ~1% ν_e from μ (large flight length)

NB: it requires a specialized beam, not a "pluggable" technology for existing super-beams (unfortunately!)