ILC Beam dump experiment (H2)

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https://indico.cern.ch/event/1426116/

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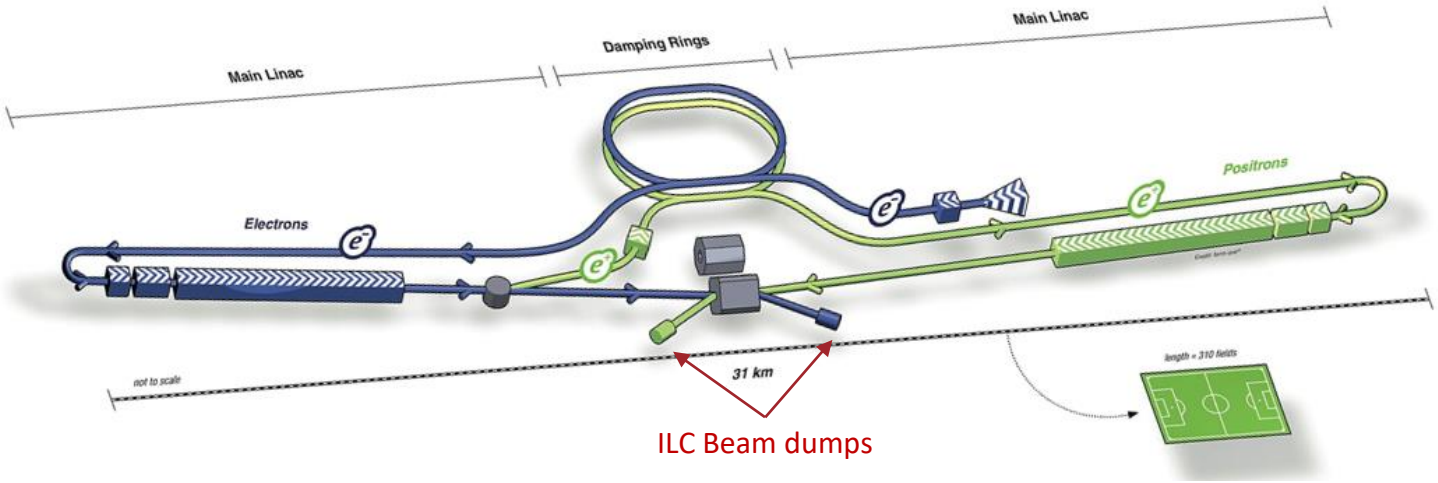
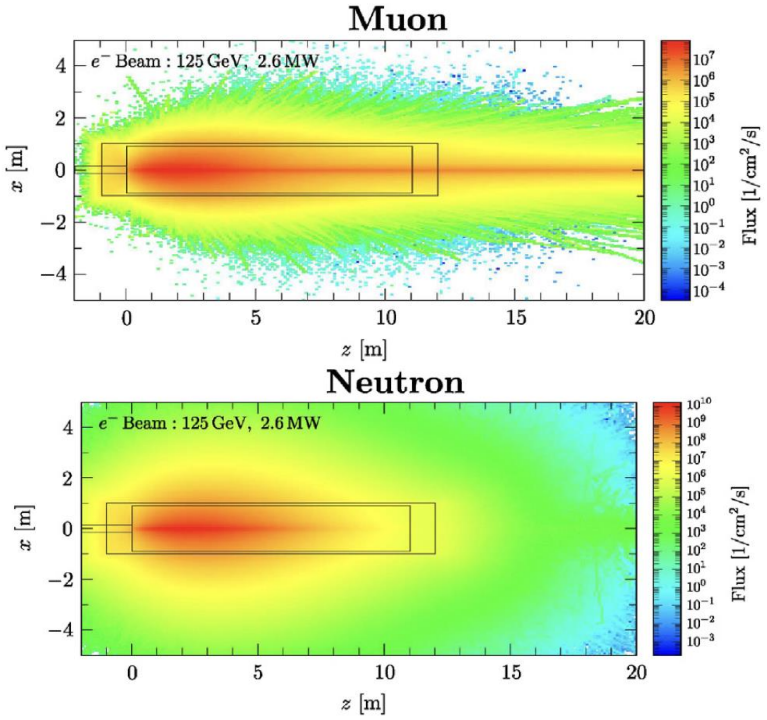
Physics goal



Context:

- Main beam dumps of **ILC (International Linear Collider)** have been proposed as **irradiation facilities** (Sakaki et al, NIMA 1050 (2023) 168144 https://doi.org/10.1016/j.nima.2023.168144)



Goal of the present experimental activity:

- Obtain experimental benchmark data of **secondary particles** from ILC-like beam dump (low-Z) irradiated by multi-GeV e- and e+ beams:
  - **Forward peaked μ pairs** produced from the interaction between e+ and atomic e-
  - **Neutrons**

beam parameters and setup

Coordinates:

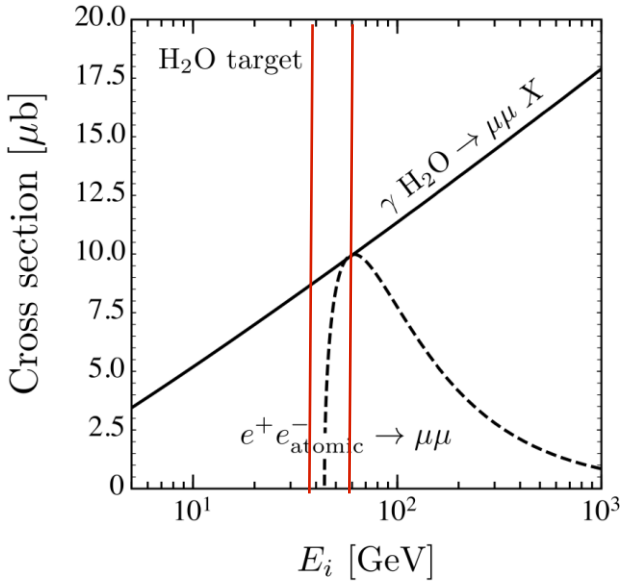
- PPE172, H2 - Control Room HNA383
- June 3-12, 2024 – beam time was extended to start earlier

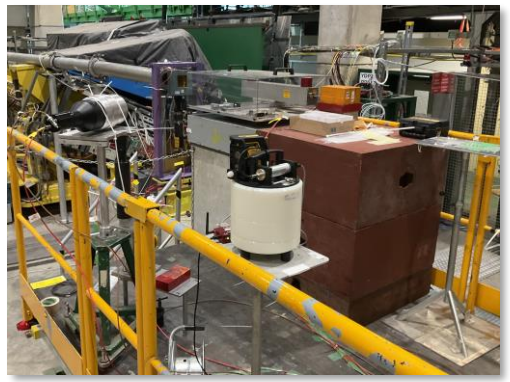
Beam parameters:

- **40** and **60 GeV/c**
  - e- and e+: up to $1.4 \cdot 10^6$ particles/spill (higher than initially expected!)
  - π- and π+ < 10^5 particles/spill (To subtract hadron contribution in e-/e+ beams)

Instrumentation:

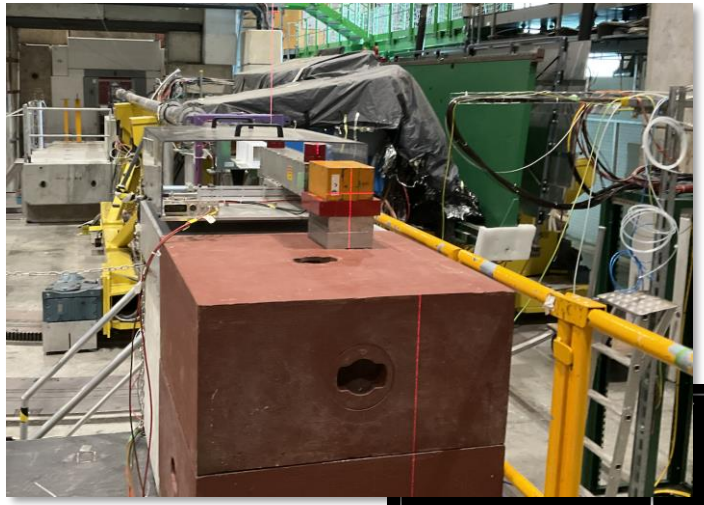
- 40 cm long PMMA target (Maximize e+/e-→μ+μ-, minimize other secondaries)
- PWO4 calorimeter to distinguish among MIP, EM, and hadron
- DWC to see the x-y distribution of MIP
- EJ301 and WENDI to measure neutron (and neutron dose)

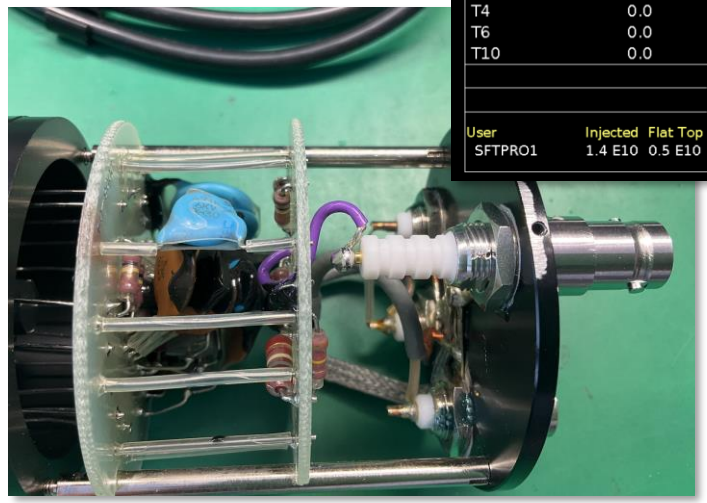


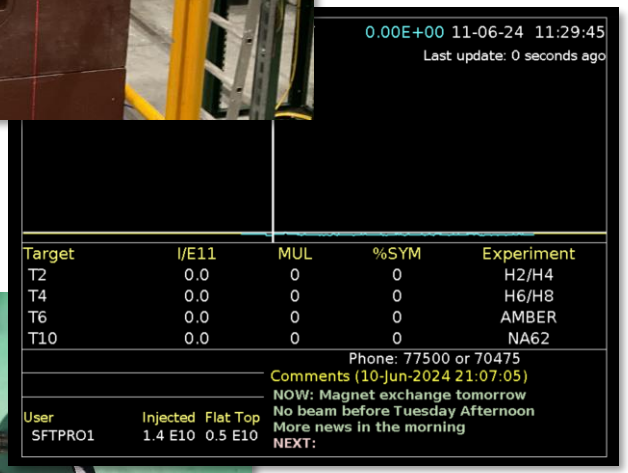


Some (solved) issues

- Maximum HV and polarity of PMTs HV
- 6V power
- Gas connections and supply
- Alignment (first string then laser alignment)
- Gas leakage on DWC
- Voltage drop due to high count rate on calorimeter (managed to reduce intensity and gain in purity)
- No beam from Monday morning







Thank you!

- We acquired the data we needed; analysis is now ongoing!
- Many thanks for providing good beam quality (despite the difficulties with the SPS), for technical support and your availability before and during the measurement campaign!

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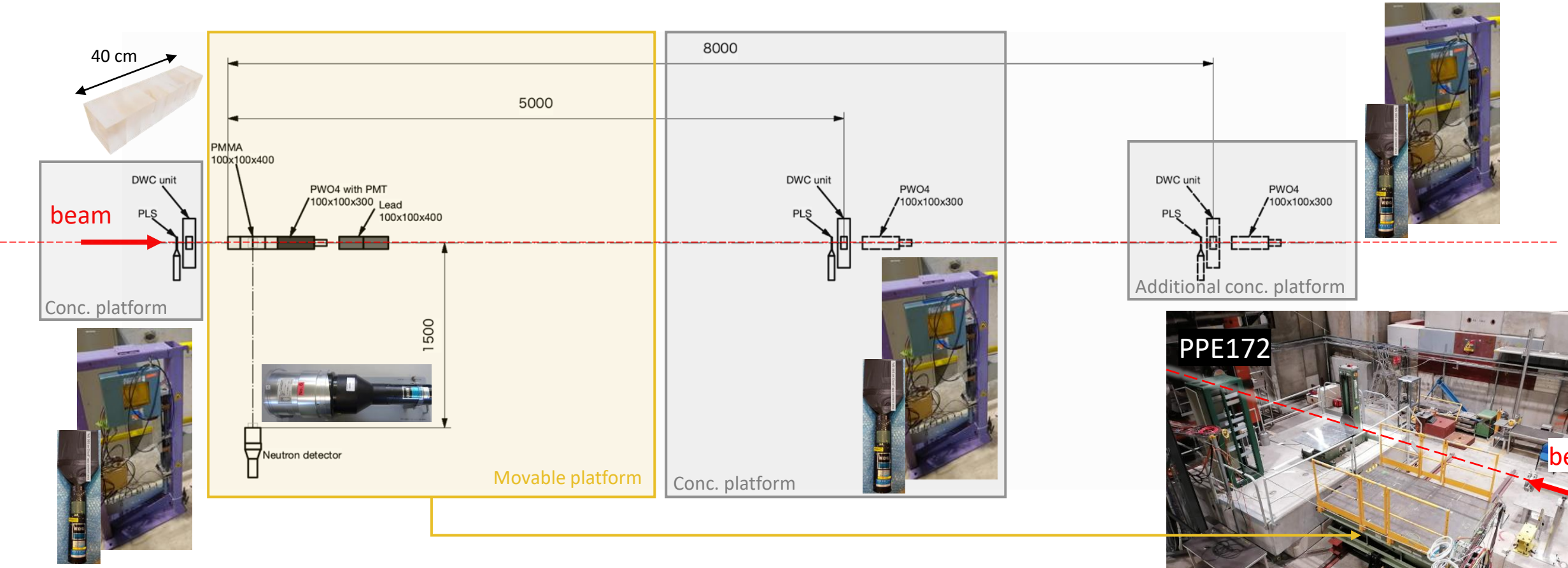
beam parameters and installation (2)



Schematic layout in PPE172