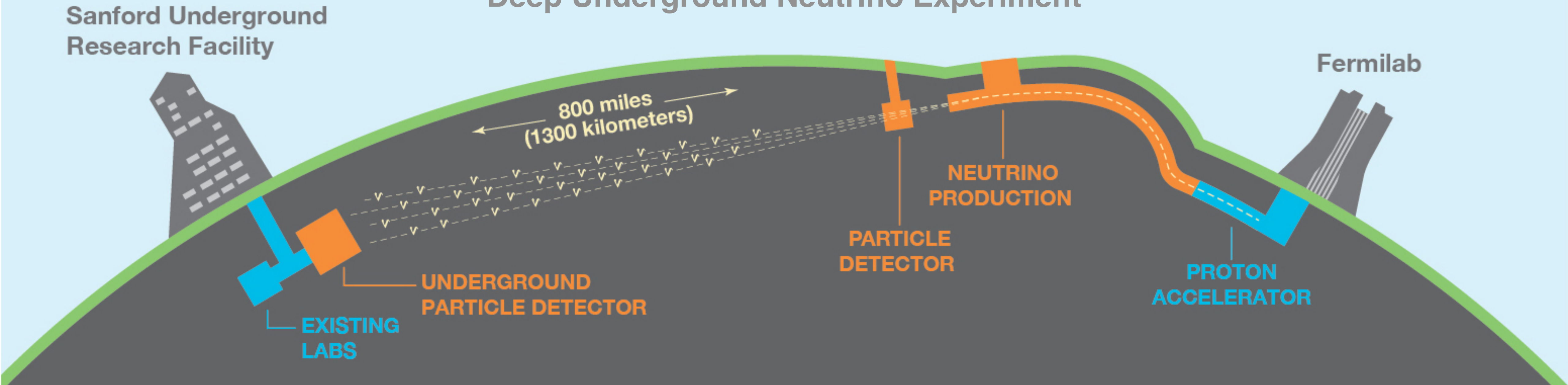# PhD on DUNE experiment at APC

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22 May

Deep Underground Neutrino Experiment

Next-generation, long-baseline neutrino oscillation experiment with:

- Wideband neutrino beam, ($\sim$ **0.1 – 10 GeV**) generated at Fermilab, Illinois

- **Near Detector (ND)** at Fermilab

- Four **Far Detector (FD)** modules of 17 kt each using Liquid Argon Time Projection Chambers (**LArTPC**)

- The experiment search to answer open question in the field of particle physics, astronomy and cosmology (**CP violation phase** in the leptonic sector, **octant of mixing angle θ_{23}, mass hierarchy,** etc.)

DUNE will serve as an observatory for astrophysical sources of neutrinos:

- **Supernovae**

- **Atmospheric**

- **Solar**

My research topic on Atmospheric neutrinos

Neutrino/antineutrino discrimination could significantly improve the sensitivity to **mass ordering** with atmospheric neutrinos

It's not possible to do **charge discrimination** with LArTPC (no magnetic field)

One way to discriminate is by **Muon charge tagging** via capture vs decay (with Michel-e)
- μ^+ always decays in e^+. μ^- can decay to e^- (~ 28%) or be captured (~72%)
- We want to recognize Michel-e from μ decays

I'm using DUNE framework (**L**iquid **Ar**gon **Soft**ware (LArSoft)) to check the simulation output and implement algorithm for the reconstruction of Michel electrons
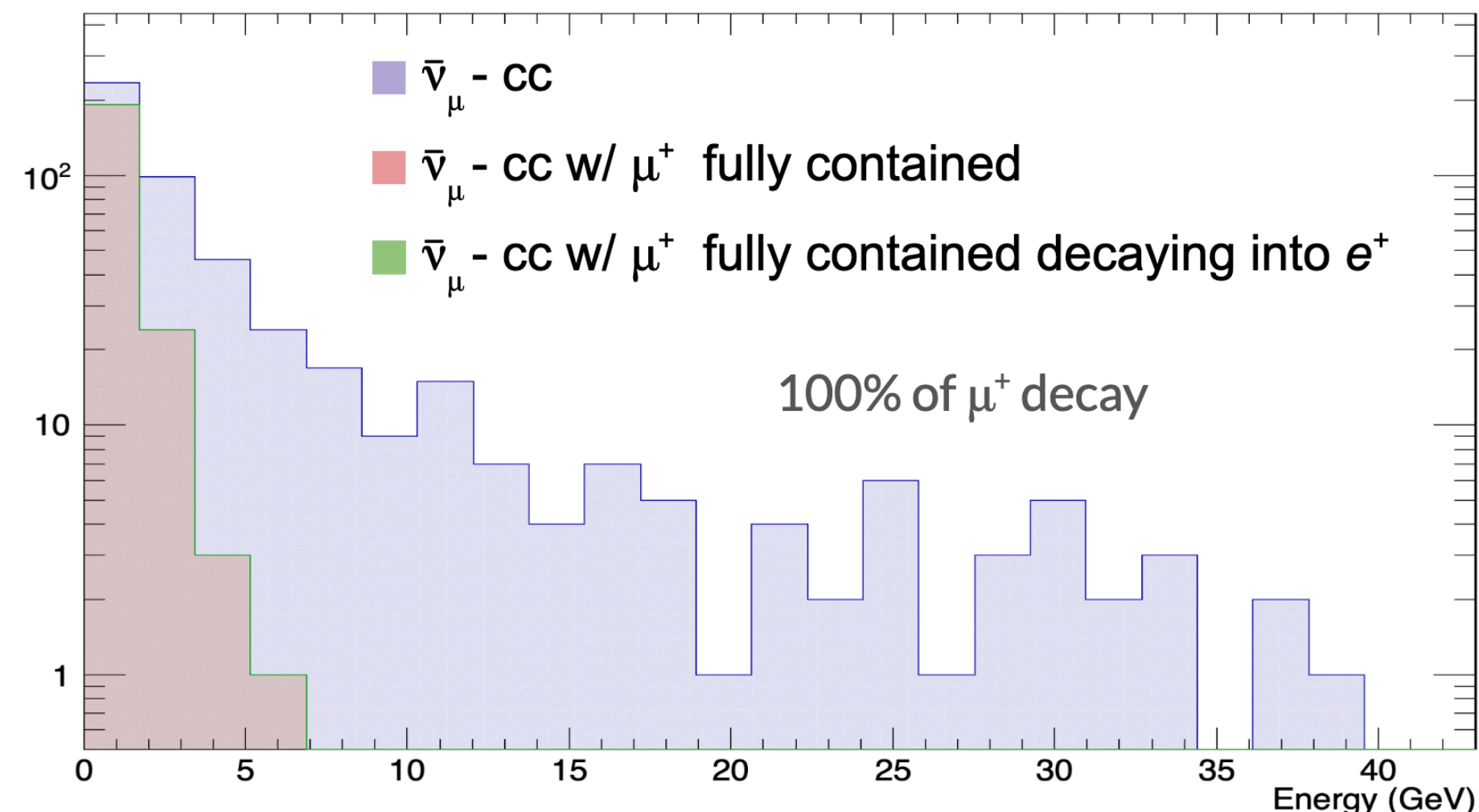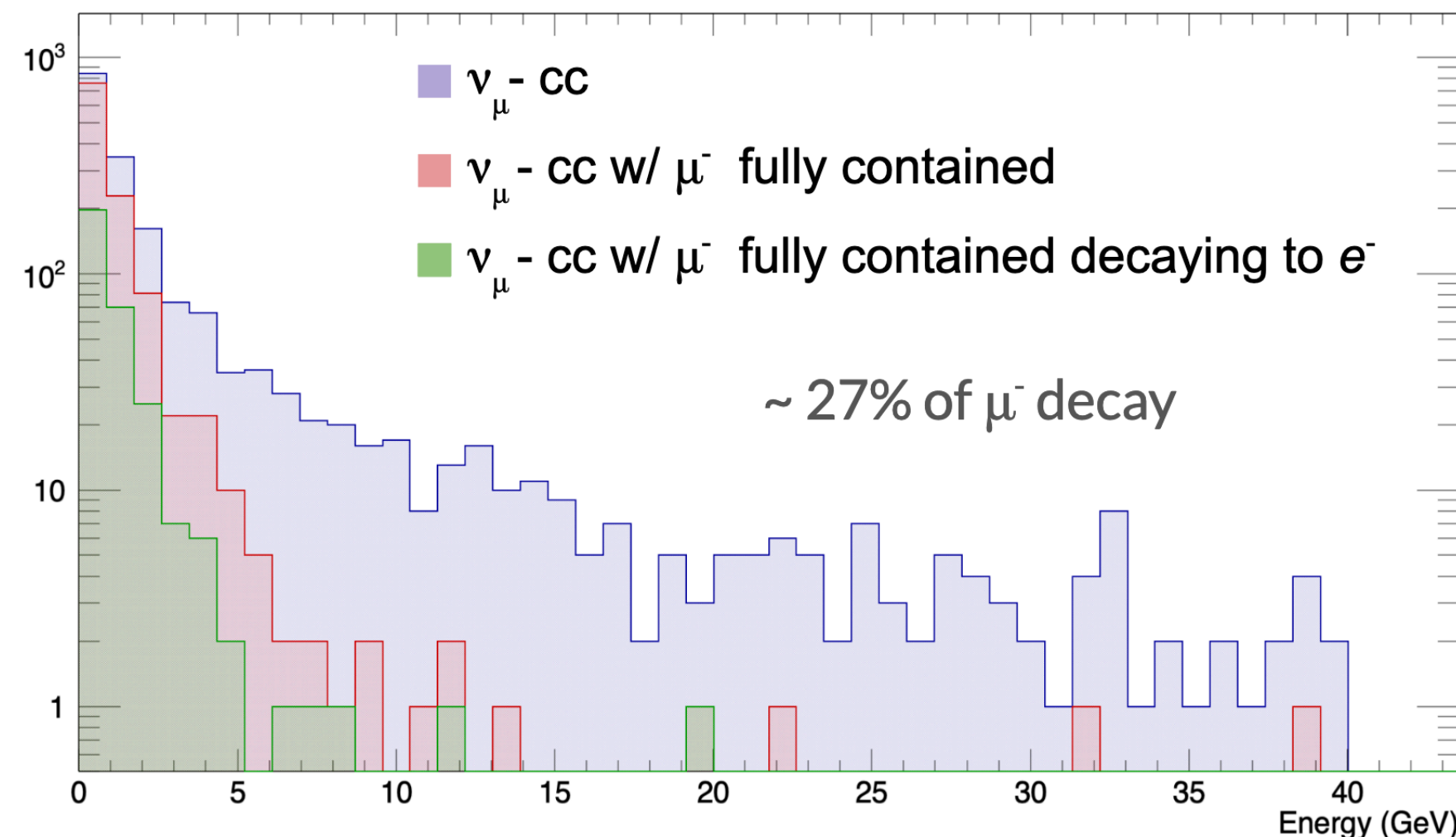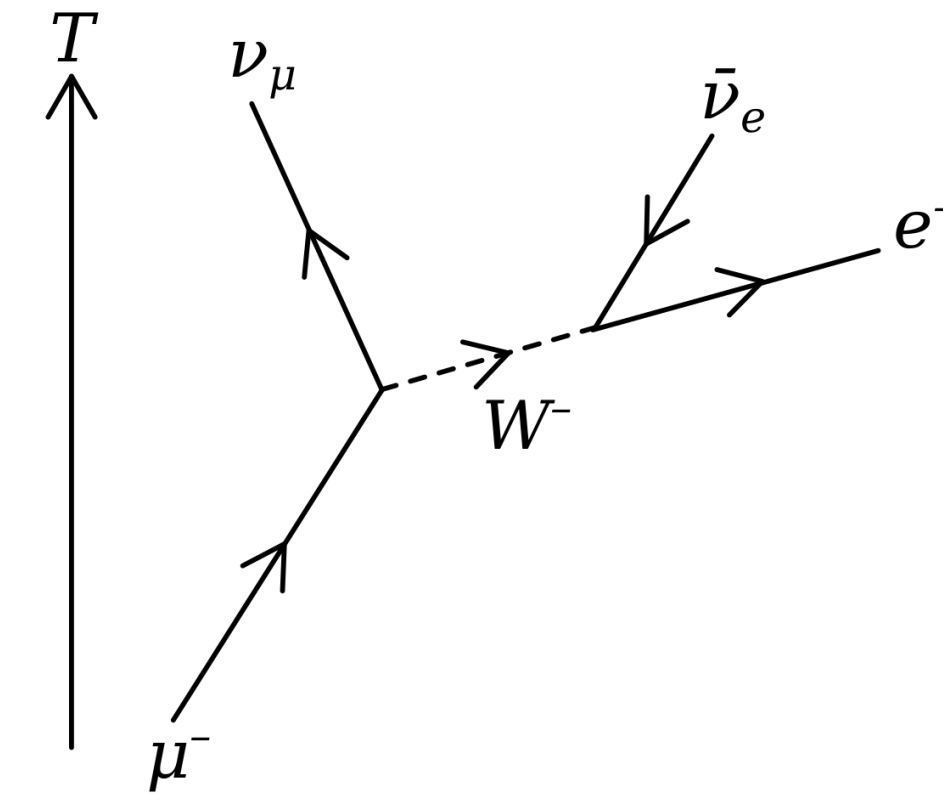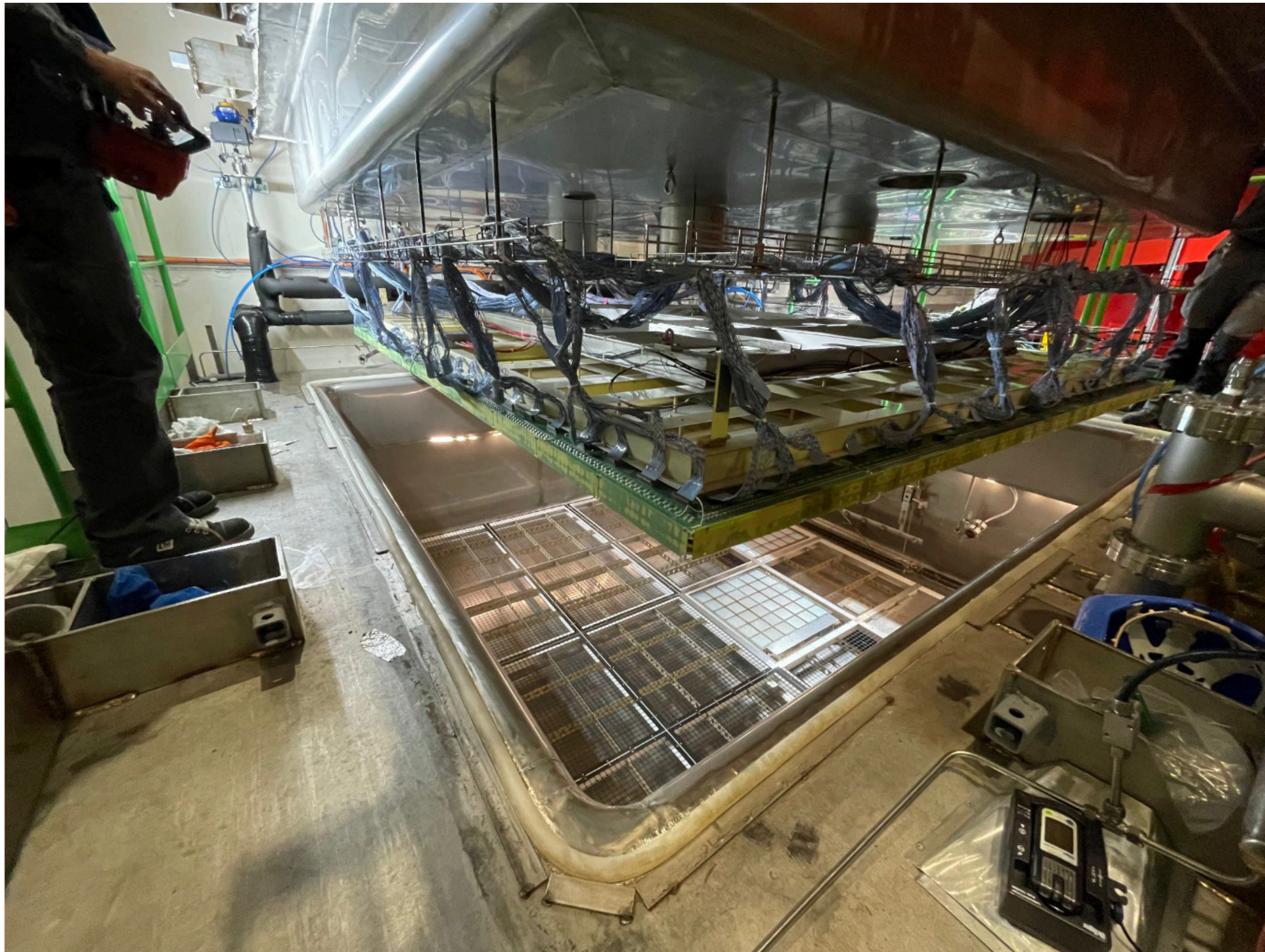

Algorithm under development to select the Michel-e reconstructed

ColdBox at CERN

Signal over Fiber, a new technology **developed at APC**, composes the cold electronics and allows operation of the photon detectors in surface at high voltage

Analysis on the **cold electronics** of the Photon Detection System (PDS).

- The performance of the PDS needed to be established

- I helped on the verify the linear response of light collection

  - By flashing LED with different intensity I evaluated amount of photons detected