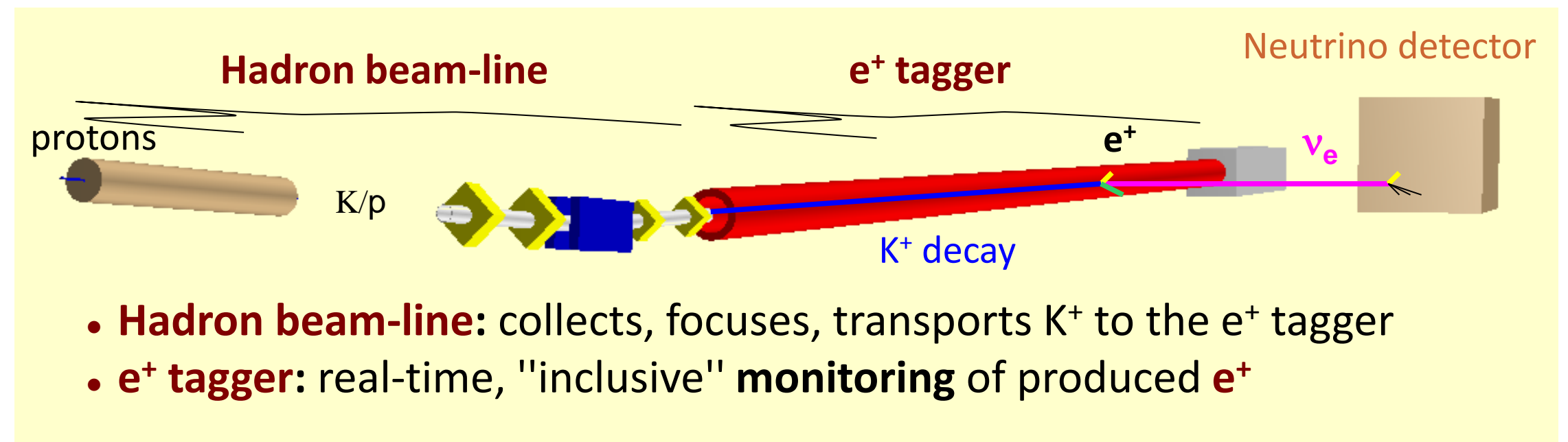


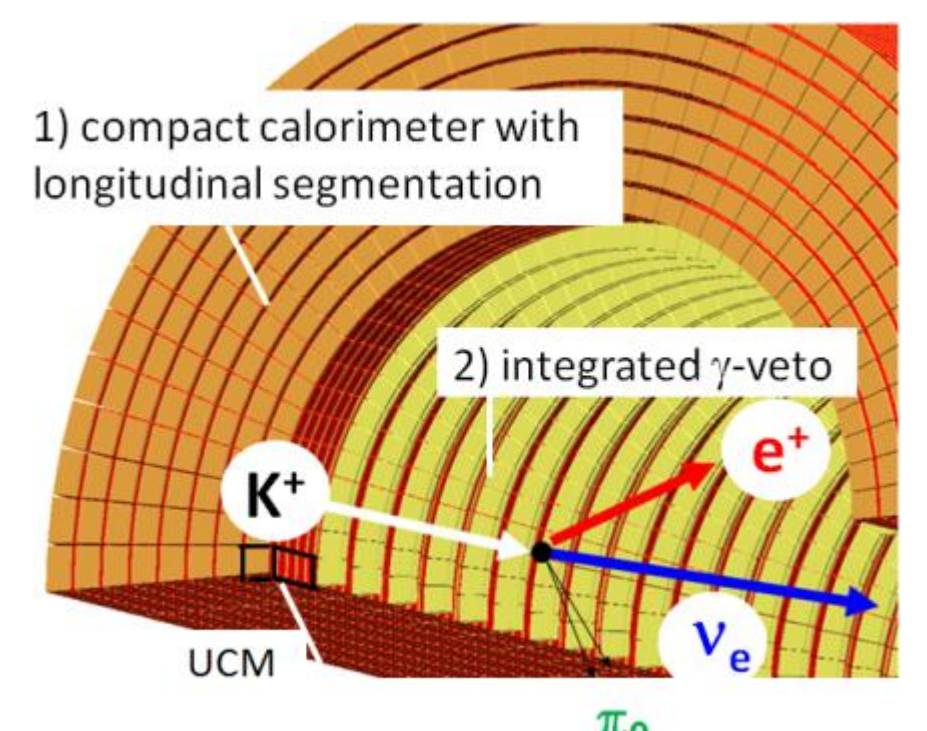
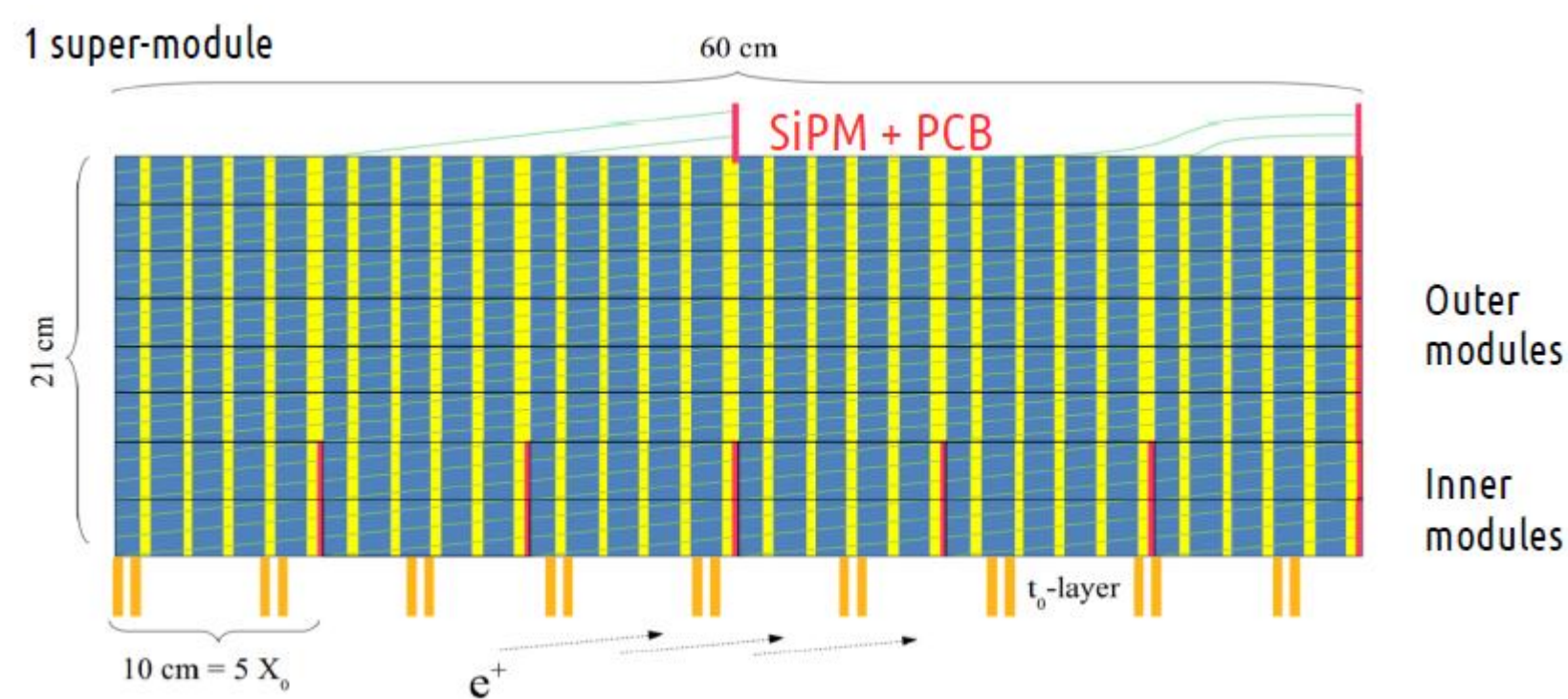
A new-concept ν_e source based on tagging of e^+ from $K^+ \rightarrow e^+\pi^0\nu_e$ decays

The goal of the project is to demonstrate the **feasibility of real time monitoring of the positrons produced at high angle in the decay tunnel of conventional neutrino beam** to obtain a $\times 10$ reduction in the systematics on the neutrino flux \rightarrow Highly beneficial for the **leptonic CP violation** international program at long baselines ($\nu_\mu \rightarrow \nu_e$).



Tagger challenges

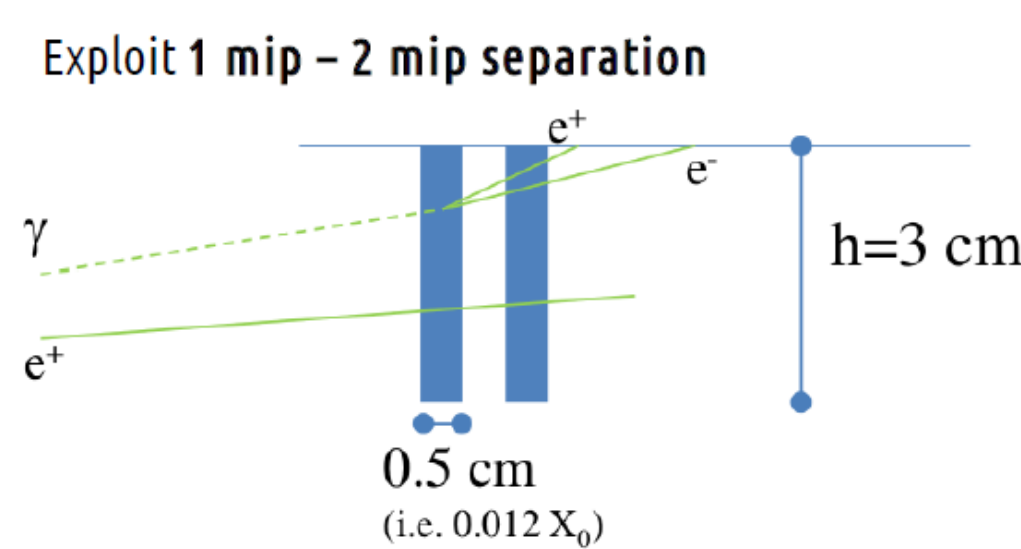
- particle rates: $> 200 \text{ kHz/cm}^2$
- backgrounds: pions from K^+ decays
- extended source of $\sim 50 \text{ m}$
- spread in the initial direction



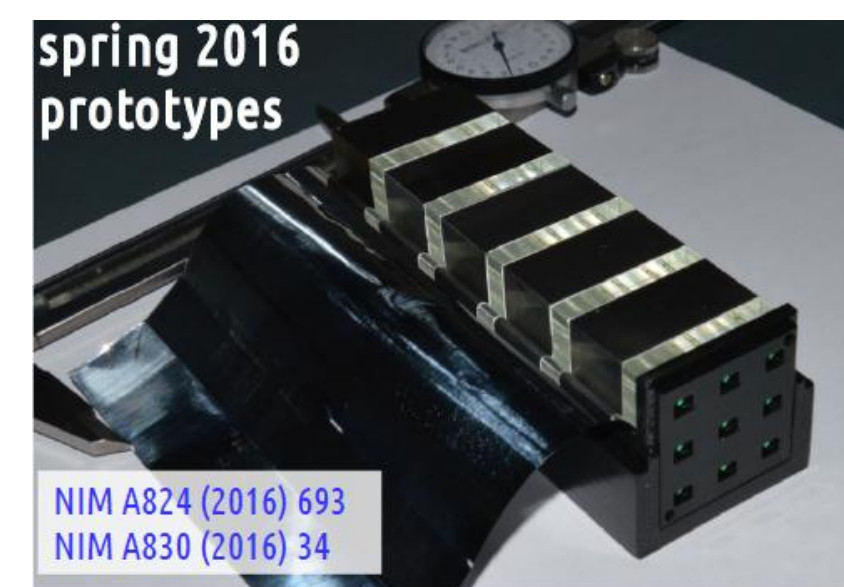
Technological challenges

- Radiation hard components: harsh environment
- Readout system: embedded in the calorimeter bulk
- Recovery time: $O(10\text{ns})$
- Readout in triggerless mode: long extraction (10 ms)
- Degassing: detector inside the beam-pipe
- Scalable /cheap technology: up to $\sim 2 \cdot 10^5$ channels

t_0 - Layer



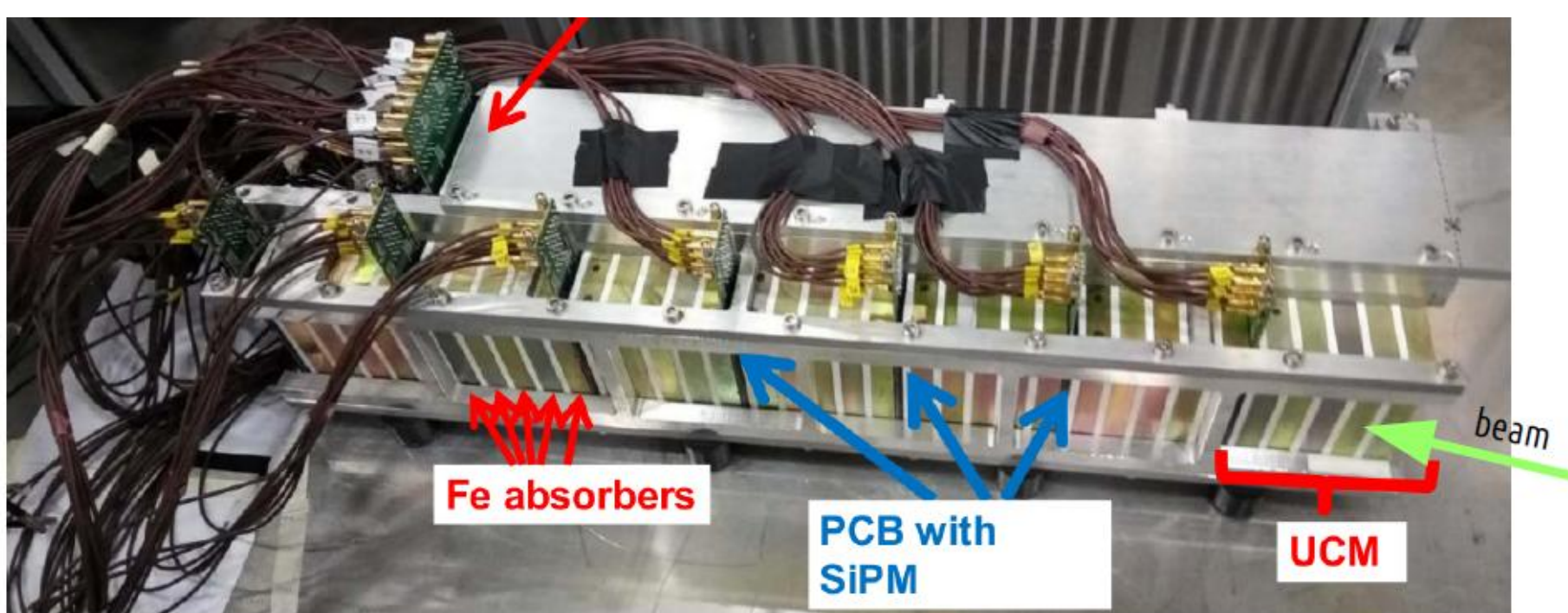
The Ultra-Compact Module (UCM)



- 1 SiPM \leftrightarrow WLS fiber
- 9 SiPM signals are added
- No WLS bundling
- Optimal homogeneity in longitudinal sampling

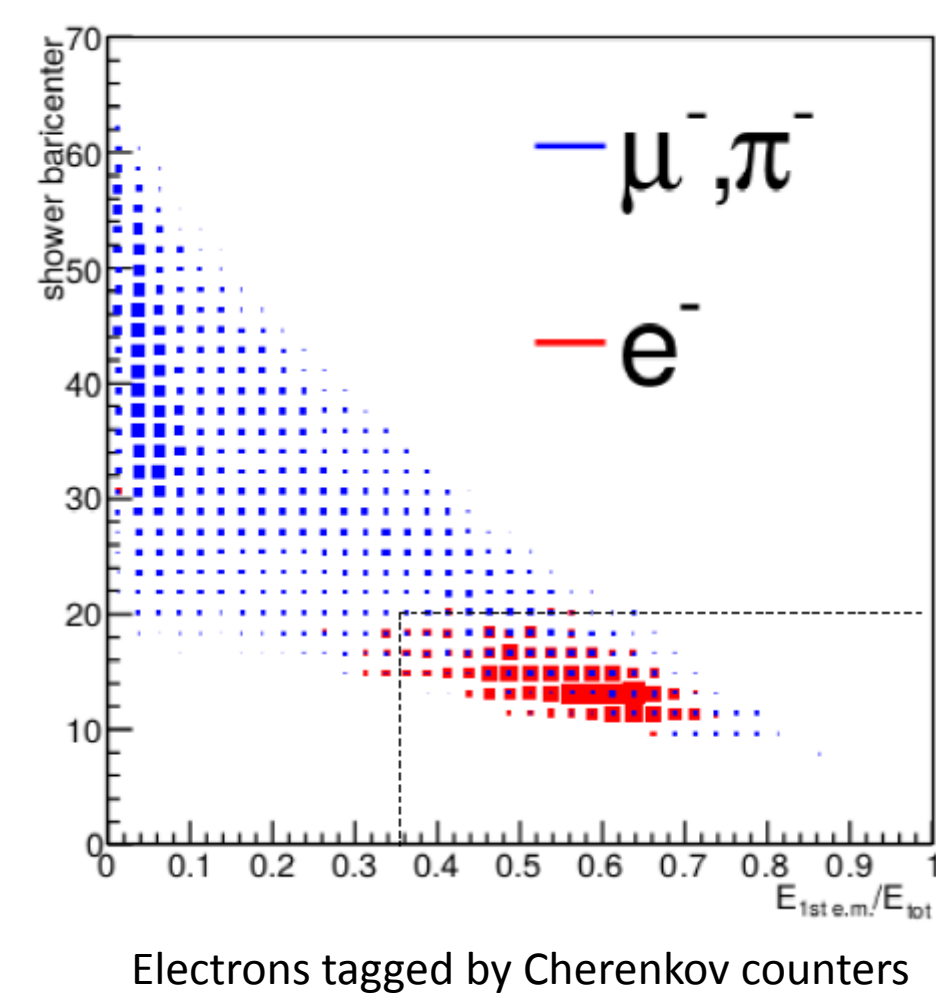
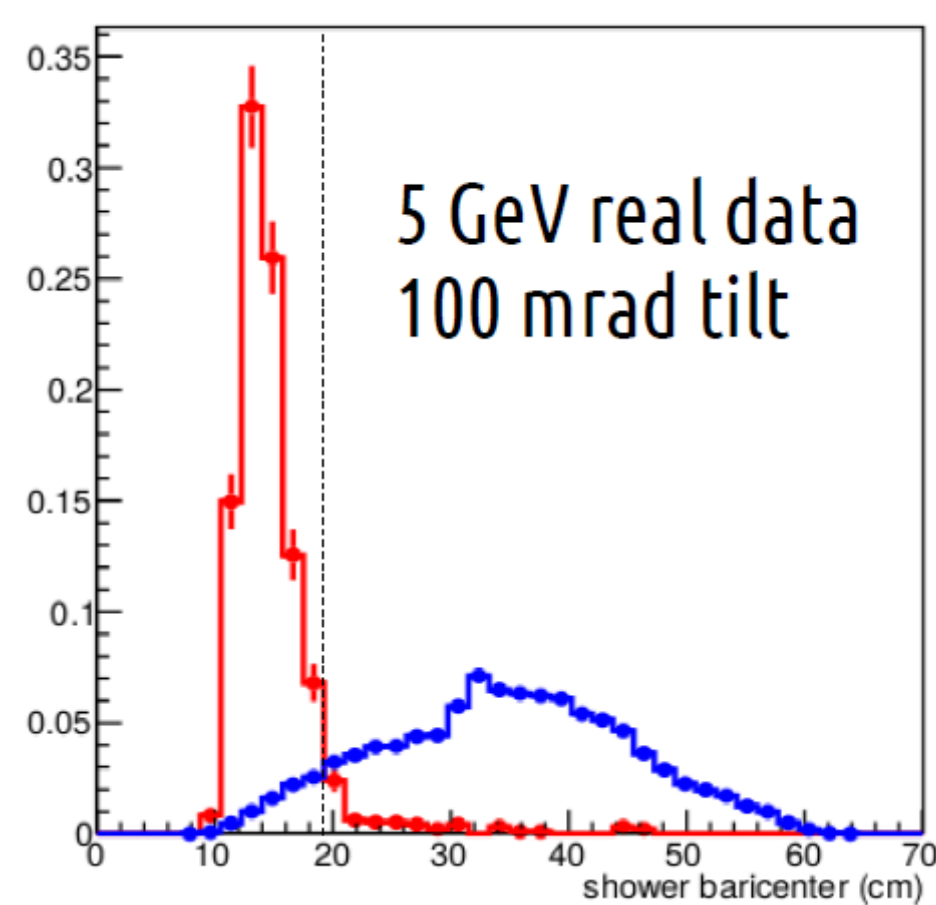
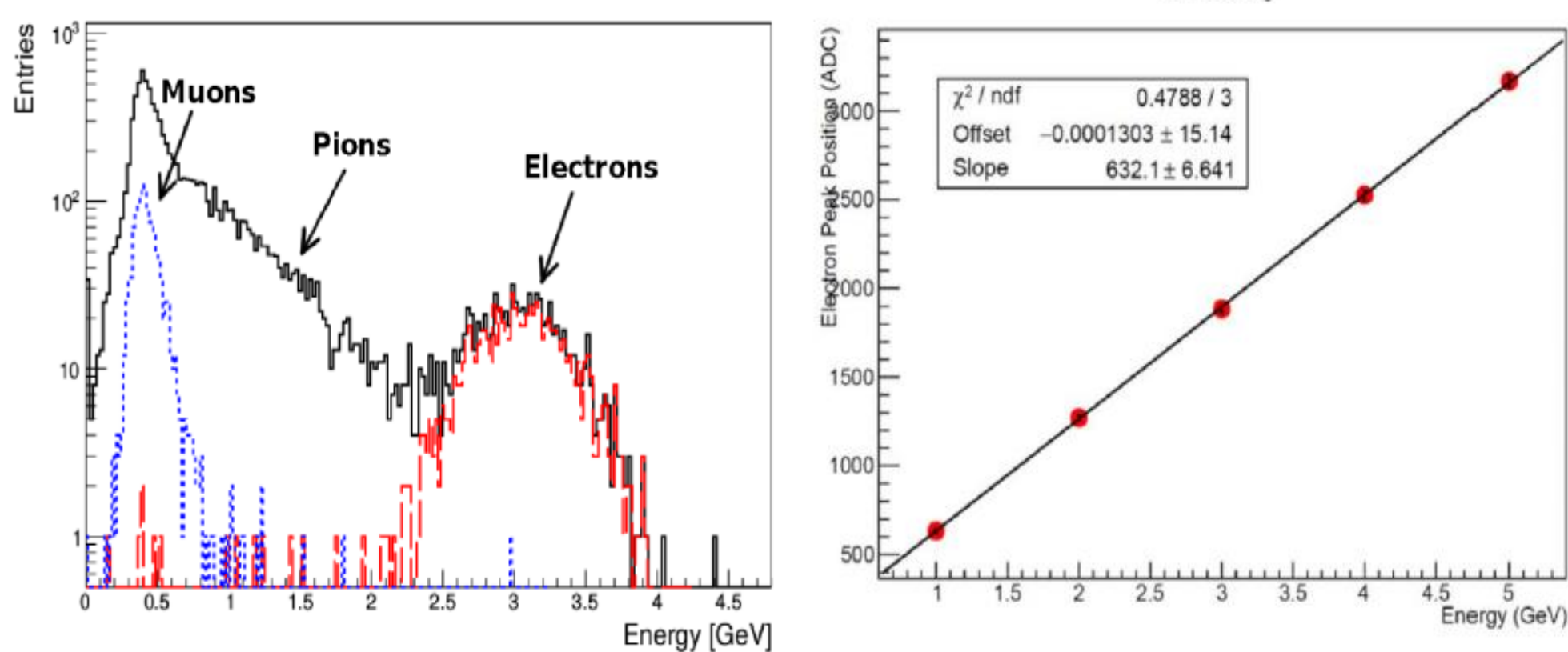
Testbeams @ CERN-PS T9 July/November 2016: SCENTT

Shashlik Calorimeters for Electron Neutrino Tagging and Tracing



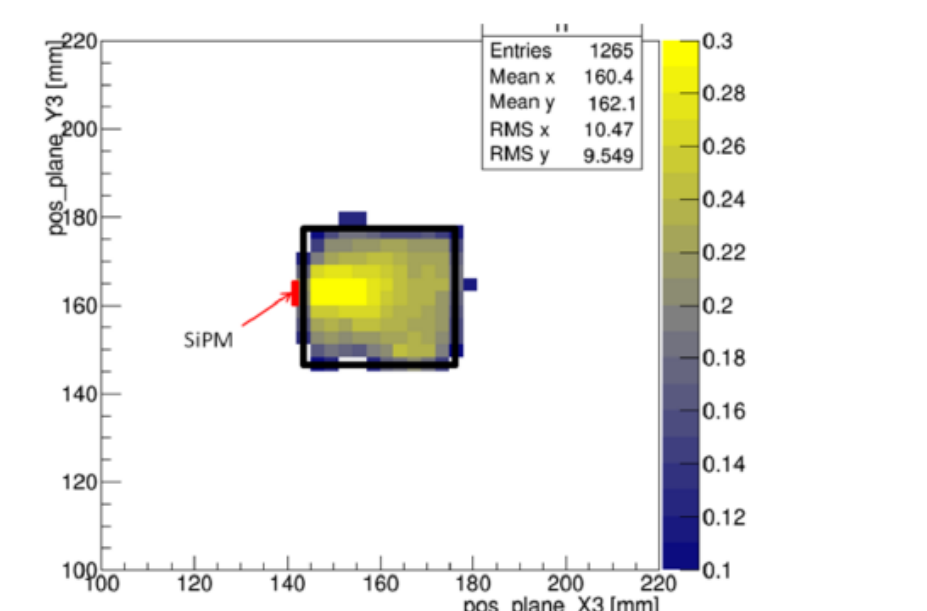
56 e.m. + 18 adronic UCMs $\rightarrow \sim 30 X_0 \rightarrow e/\pi$ separation study

- Sensitivity to M.I.P \rightarrow UCM auto-calibration viable
- No saturation effect for e.m. showers up to 5 GeV

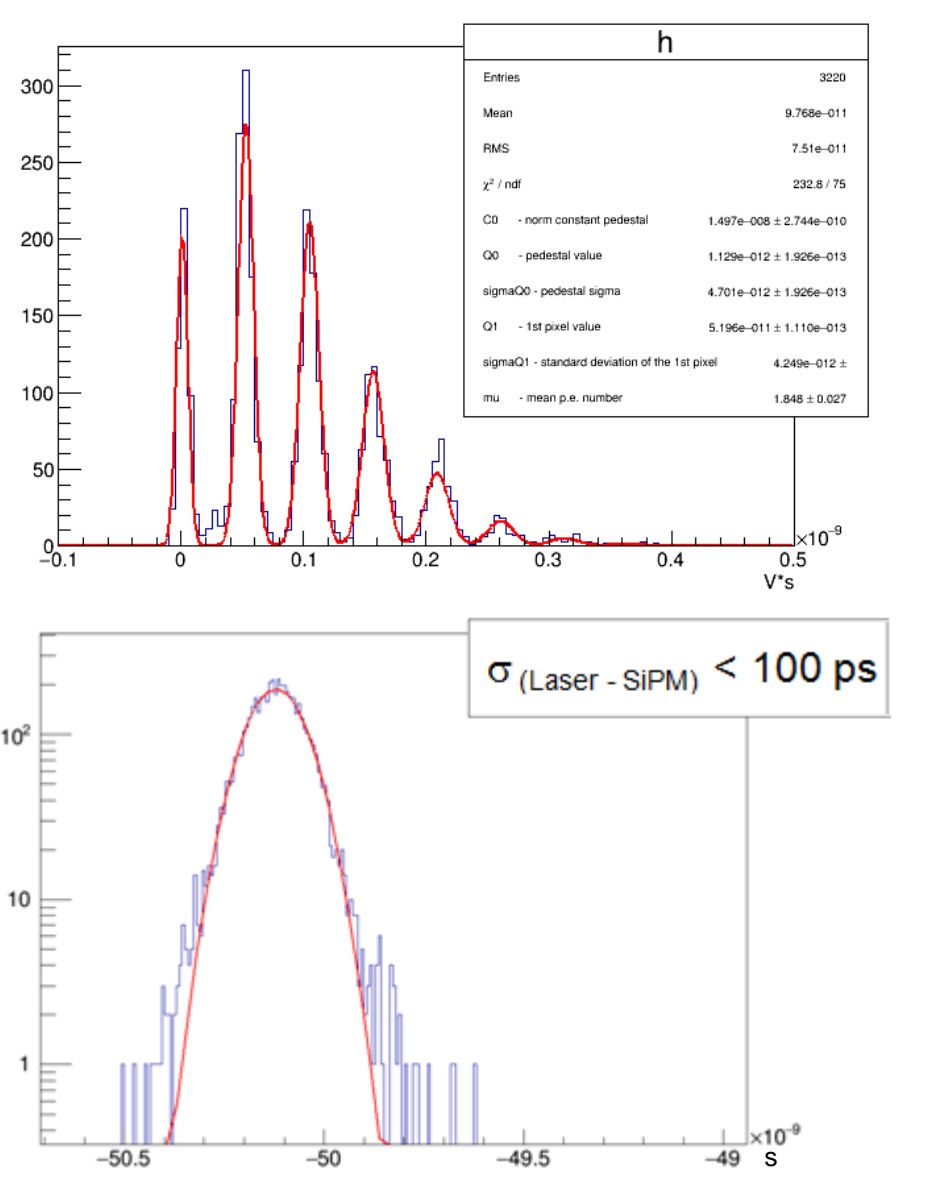


t_0 layer R&D

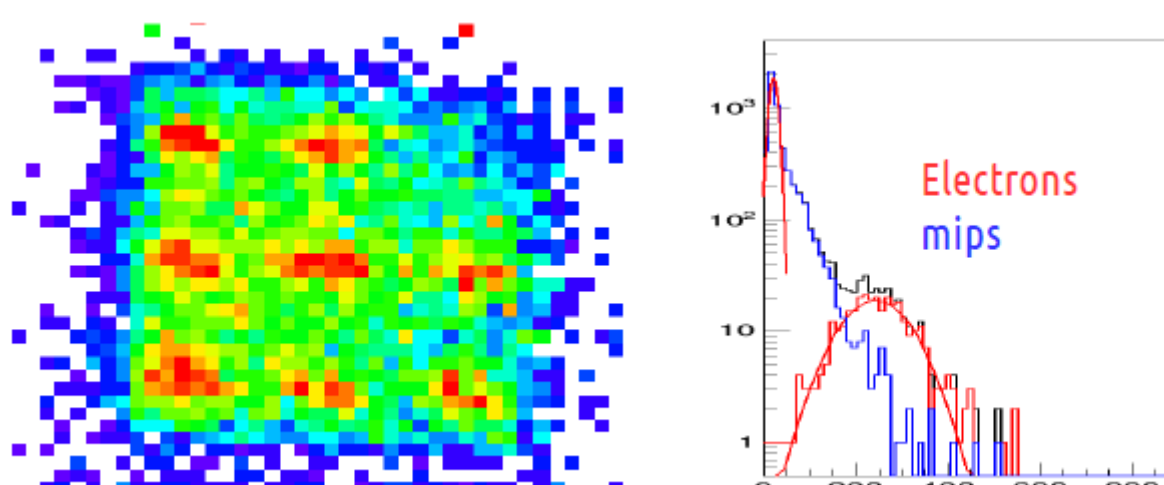
Uniformity first test: direct coupling SiPM-scintillator



Time response SiPM SenSL 30020 Series J
 Directly pulsed with Picosecond Laser ($\lambda = 405 \text{ nm}$)



Polysiloxane scintillator R&D: INFN-PD and LNL (S. Carturan)



- No drilling/molding of tiles
- First time Test in HEP @T9 November 16th

New prototype under development:

- Light Yield maximization
- Collection efficiency improvement

References

- [1] "A novel technique for the measurement of the electron neutrino cross section" A. Longhin, L. Ludovici, F. Terranova Eur. Phys. J. C (2015) 75:155
- [2] "Enabling precise measurements of flux in accelerator neutrino beams: the ENUBET project" The ENUBET collaboration CERN-SPSC-2016-036; SPSC-EOI-014
- [3] "A compact light readout system for longitudinally segmented shashlik calorimeters" A. Berra et al. N.I.M. A, 2016.05.123 arXiv:1605.09630