

Muon system:  
short status report

Gaia Lanfranchi - LNF-INFN

# R&D towards the Comprehensive Design Study

(slide shown in February)

## 1) Optimization of the general layout: 12/2016

number of stations, bar dimensions, thickness of passive filters;  
then start mechanical drawings, engineering.

## 2) Final choice of the scintillator types, fibers, SiPM and bar dimensions: 6/2017.

## 3) FEE (design, prototypes and test): 6/2018

### 3.1) design of a motherboard with:

- a stage for **fine control of the SiPM bias voltages** to equalize the gains and to compensate temperature variations, with a channel by channel programmable voltage regulation with remote setting/monitoring;
- a stage for **signal amplification/shaping**;
- a stage for **signal discrimination**;

3.2) design of a **TDC board with 100 ps time resolution** with data processed, zero suppressed, formatted, stored in local buffer and sent to the FARM;

3.3) **beam test** of a final module instrumented with final electronic chain;

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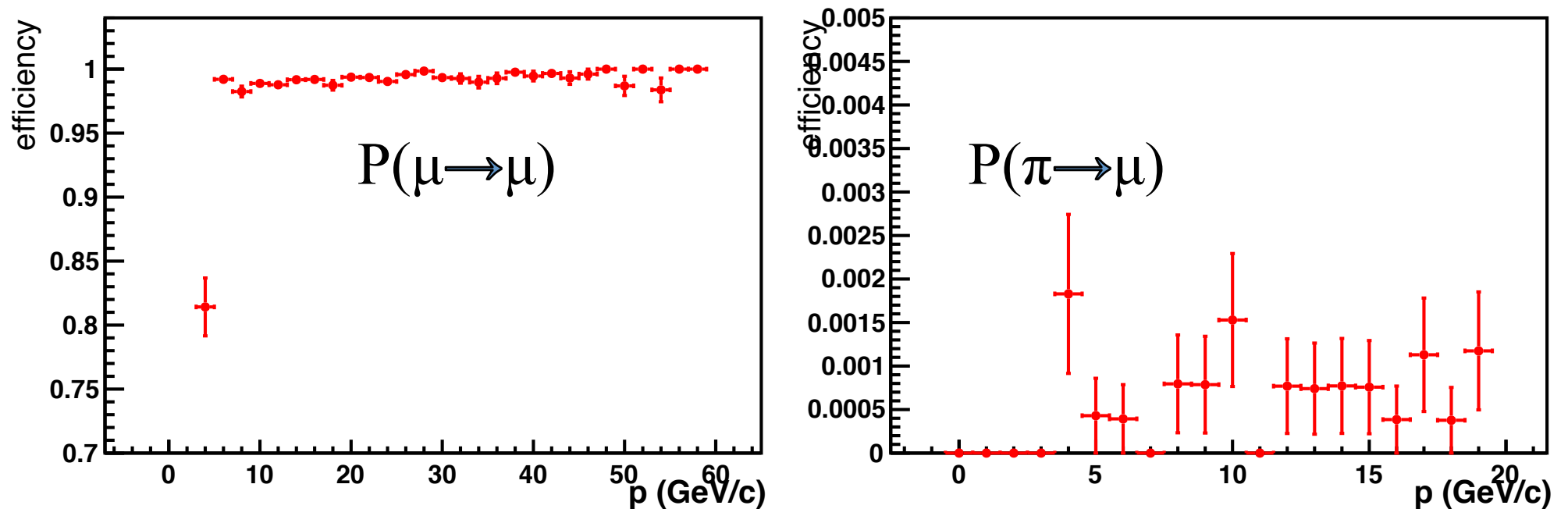
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# About the (long standing) issue of HCAL+MUON optimization:

Performance from the TP of the muon system alone.



Simple request of hits in some fields of interest in muon stations gives  $>99\%$  muon efficiency for  $< 10^{-3}$  pion mis-identification

→ background in TP under control even without PID:

→ **Which are the criteria to further optimize?**

→ I need to know the material upfront the system to define the granularity....

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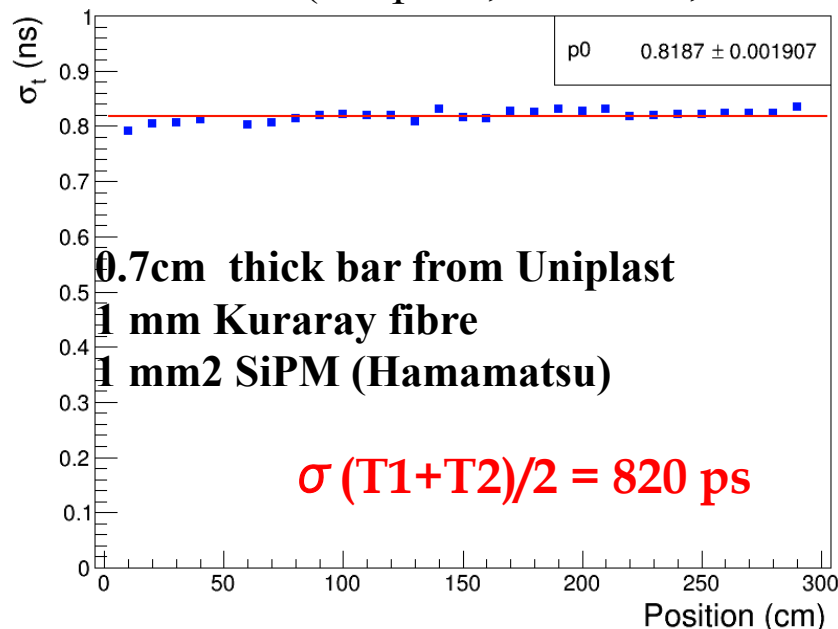
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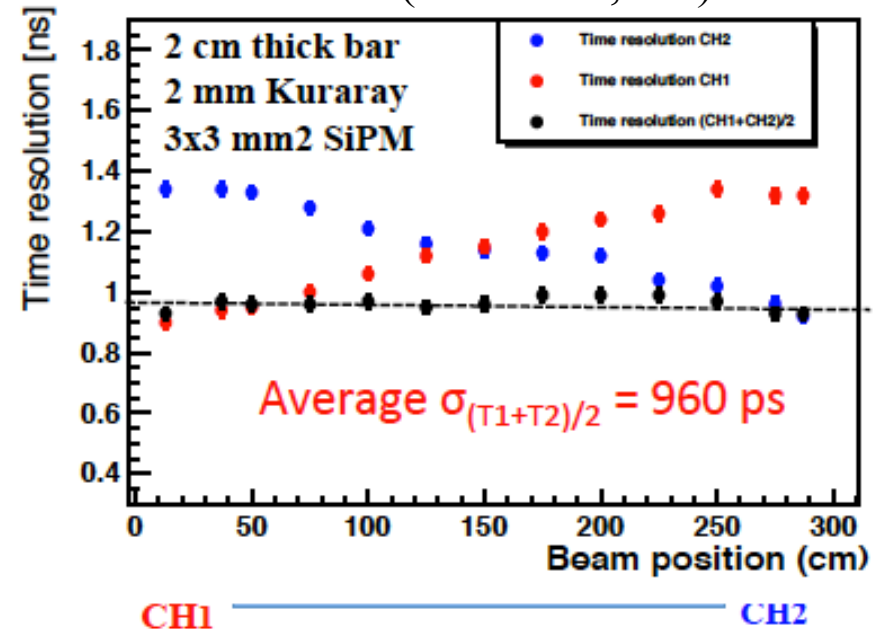
# October test beam data:

- Analysis of the data collected in the October test beam is being finalized:
  - full report already presented by A. Montanari at the SHiP week in February.
  - JINST paper in preparation.
- Main result of the test beam is the measurement of the time resolution of 3m-long bars:

## Russian bars (Uniplast, Vladimir, Russia)



## Italian bars (NICADD, US)



- Currently investigating the reason of the difference:
  - study whether we can get even better results by installing 2mm -fibers on the Russian bars.
- Two russian bars, 3m-long have been delivered in Bologna and LNF:
  - two test stands are being prepared @ LNF and Bologna to test them with cosmics
  - a new test beam will be needed to measure time resolution:

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