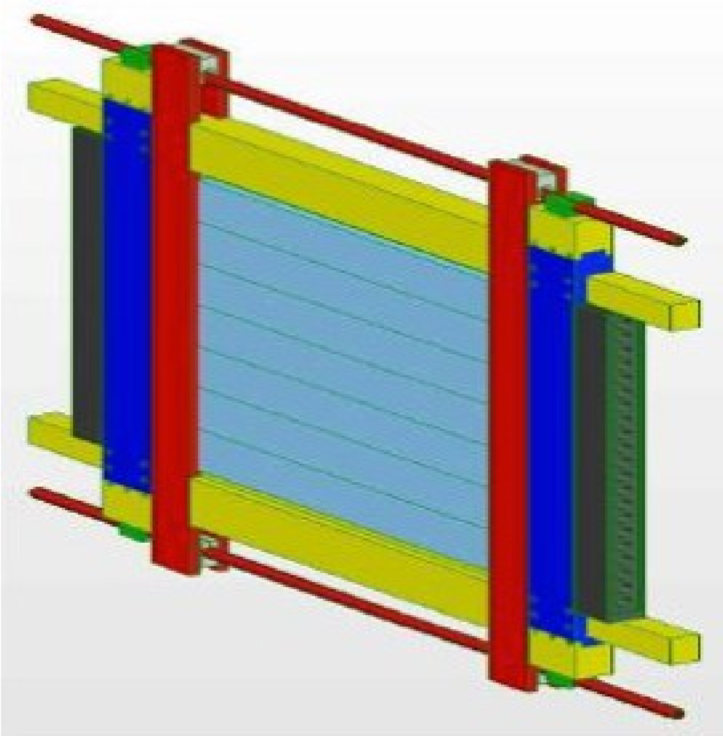
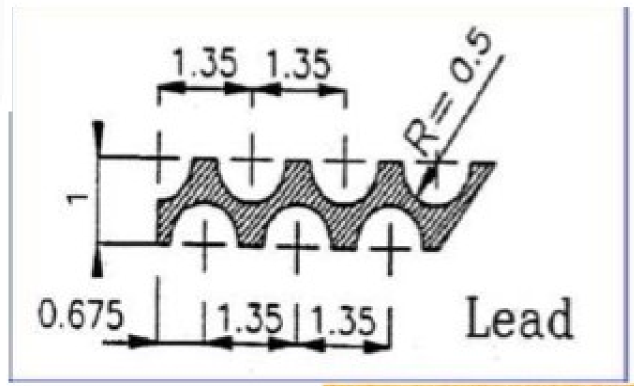
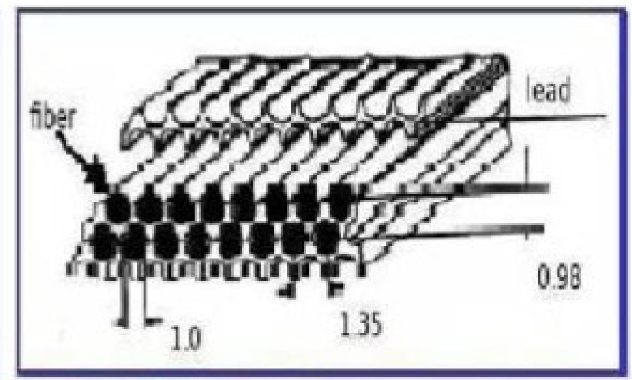


KL plans and commissioning





Domizia Orestano
CM39 Oxford
June 26th 2014

May 2008

KL status

KL's packaged

Storage of electronics, cables ....

Trolley in the garden at Roma III

KL in RAL since June 2008

KL in its very first position

KL hardware commissioning completed in 2010. Summary in

MICE Collaboration

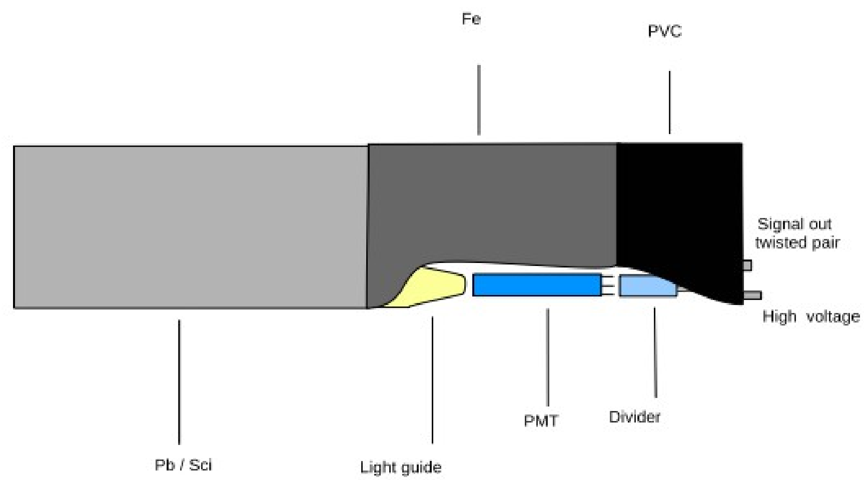
MICE-NOTE-DET-337

15 February 2011

Analysis of PID detectors (TOF and KL) performances in the MICE 2010 run

R. Bertoni [a], M. Bogomilov [b,1], M. Bonesini [a], A. de Bari [c],
G. Cecchet [c], Y. Karadzhov [d,2], D. Orestano [b], F. Pastore [b],
L. Tortora [b] and R. Tsenov [d]

KL is the most downstream part of the MICE setup (together with EMR) and has 21 cells, 42 readout channels (one for each side of a cell). In Fig. 16 a schematic view of KL is given. The light is collected by 42 Hamamatsu R1355 PMTs with voltage dividers E2624-11, providing differential output pulses on twisted pair cables with 120 Ohm impedance at 50 MHz. The signal from PMTs is sent to a shaper module [11], which shapes and stretches the signal in time in order to match the sampling rate of flash ADC's. The flash ADC's modules are 14 bits CAEN V1724 with 8 channels [12]. All the sensitive components are embedded in a soft iron structure suitably shaped both for magnetic shielding and mechanical supporting purposes.



See also operation manual from MICO page

Fig. 2. TOF2 in front of KL on their final downstream platform.

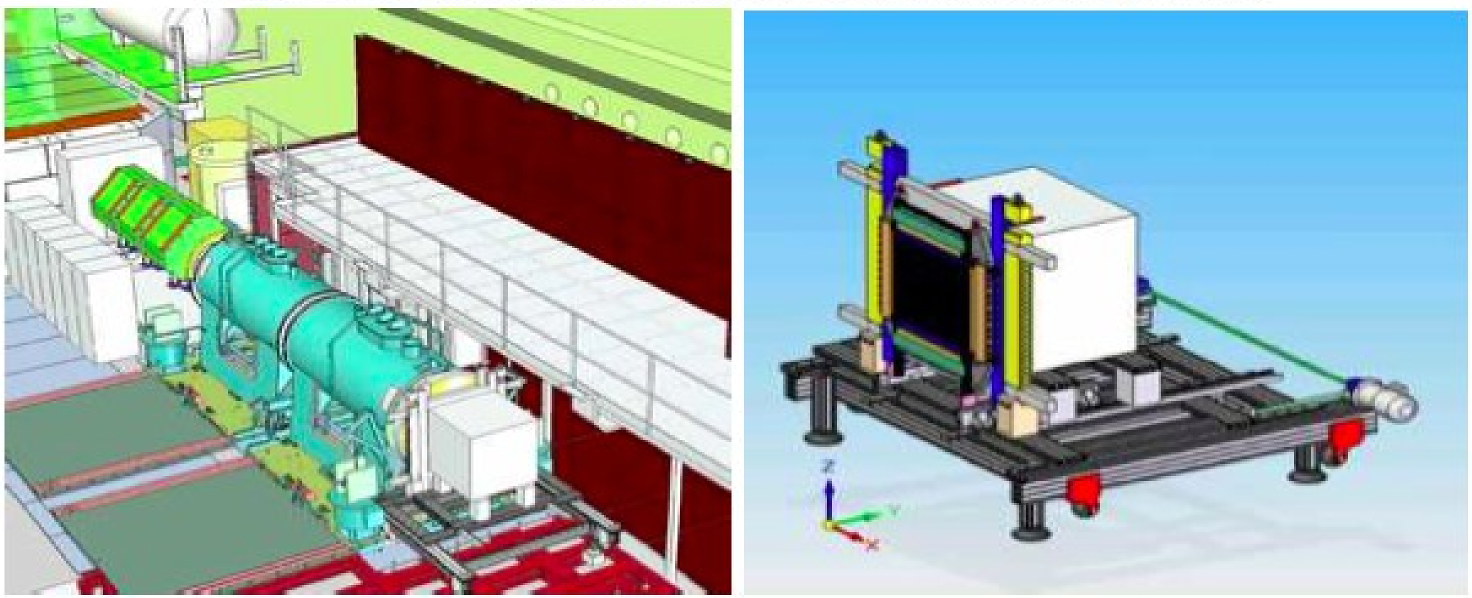


Fig. 3. Drawings of the location of downstream PID section, spectometer solenoids, and the magnets Q7, Q8, Q9 in MICE Hall (left) and the downstream PID section including TOF2, KL and EMR on their platform (right).

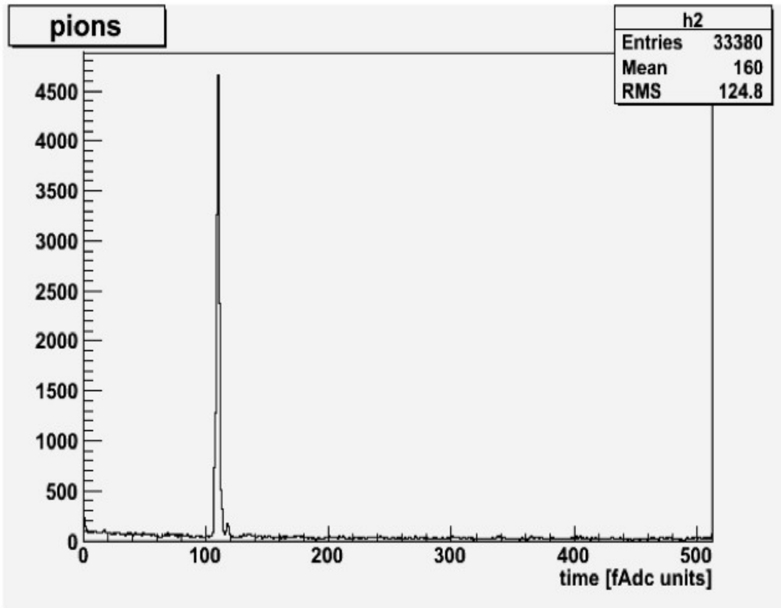


Fig. 18. Sampling of one typical KL signal. The time window is determinate to be bet (105, 115) flash ADC samples.

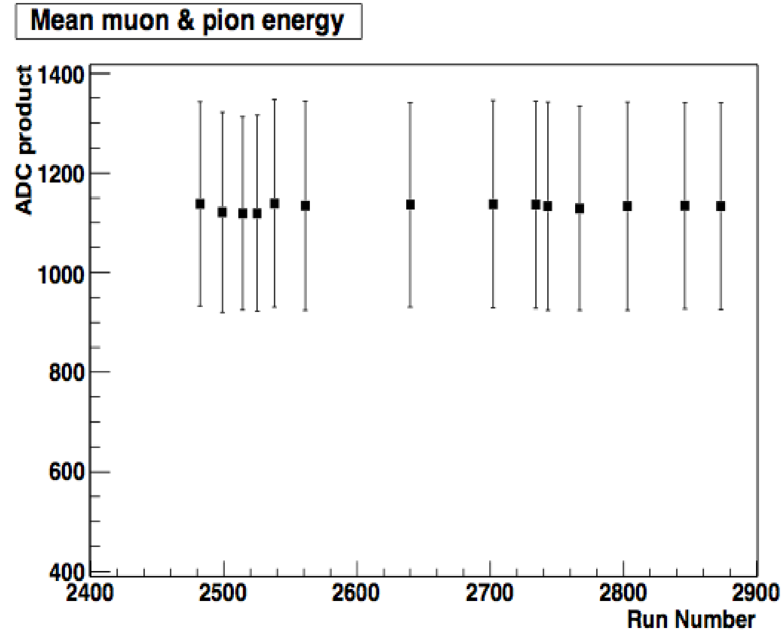


Fig. 21. Stability of KL response to muons and pions for nominal muon beam runs. The run number is on the abscissa, while on the Y-axis there is the ADC product. The error bars are the σ's of the Gaussian fit.

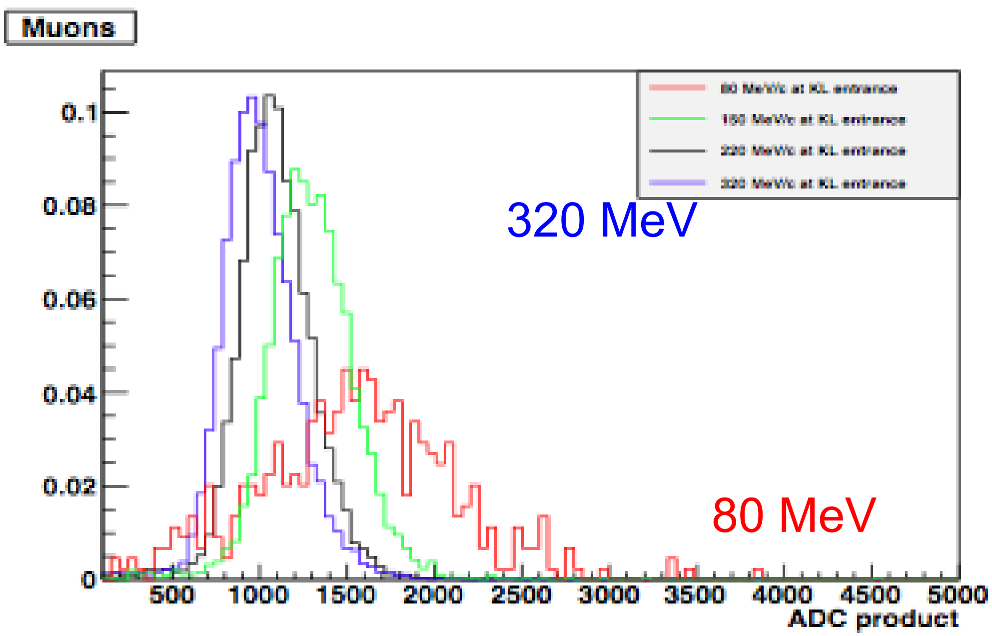


Fig. 23. KL response (normalized) to muons with different momenta.

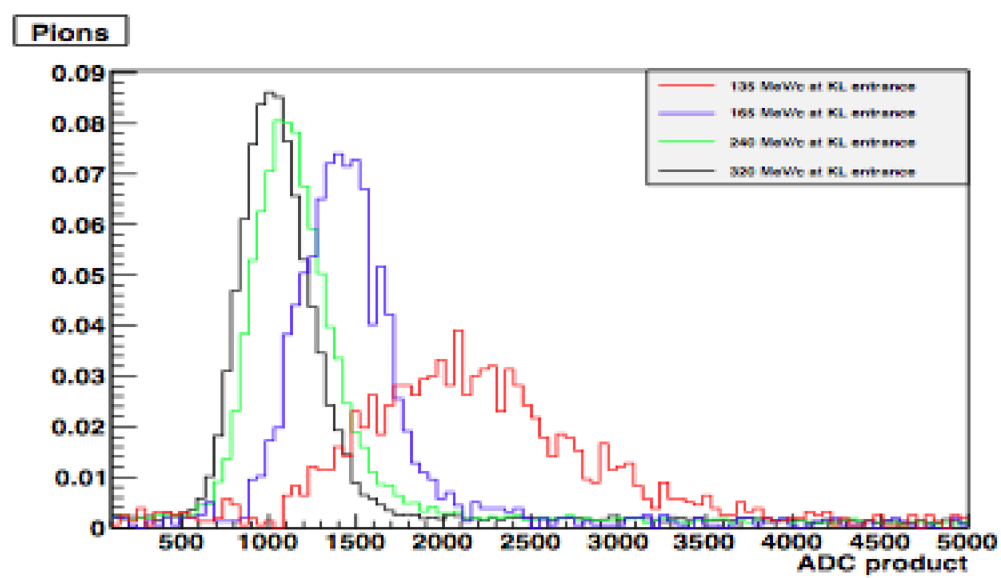


Fig. 26. KL response (normalized) to pions for different incident momenta.

Electrons

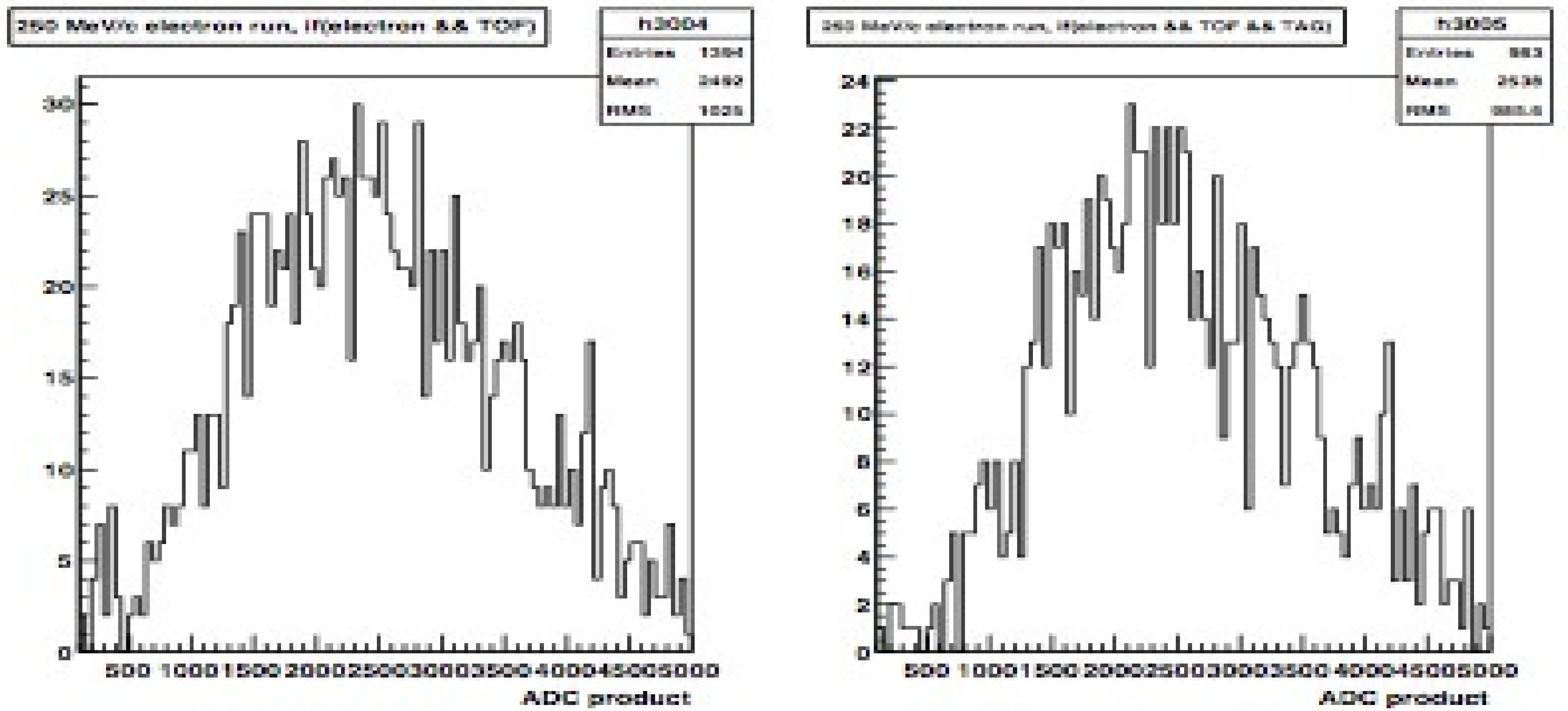


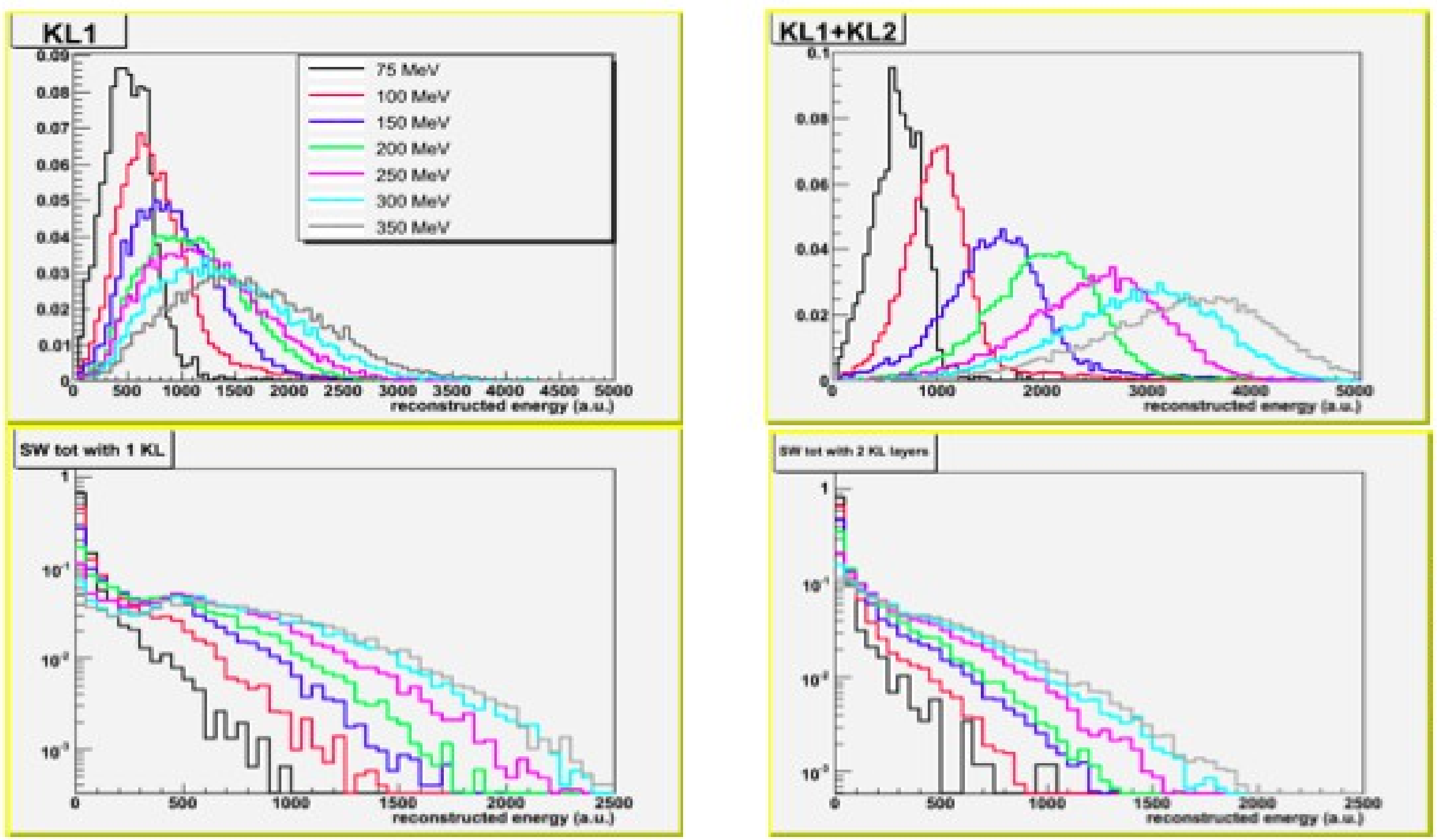
Fig. 24. KL response to 80 MeV/c electrons. Left panel: KL response to electrons hitting the central part of TOF2 station. Right panel: KL response to electrons hitting the central part of TOF2 station and hitting one of TAG counters. The fraction of surviving electrons is $\sim$ 70%.

70% of the 80 MeV electrons are not contained in KL (2.5 X0)

Back in time...

2006: prototype tests at BTF in Frascati reported at CM16

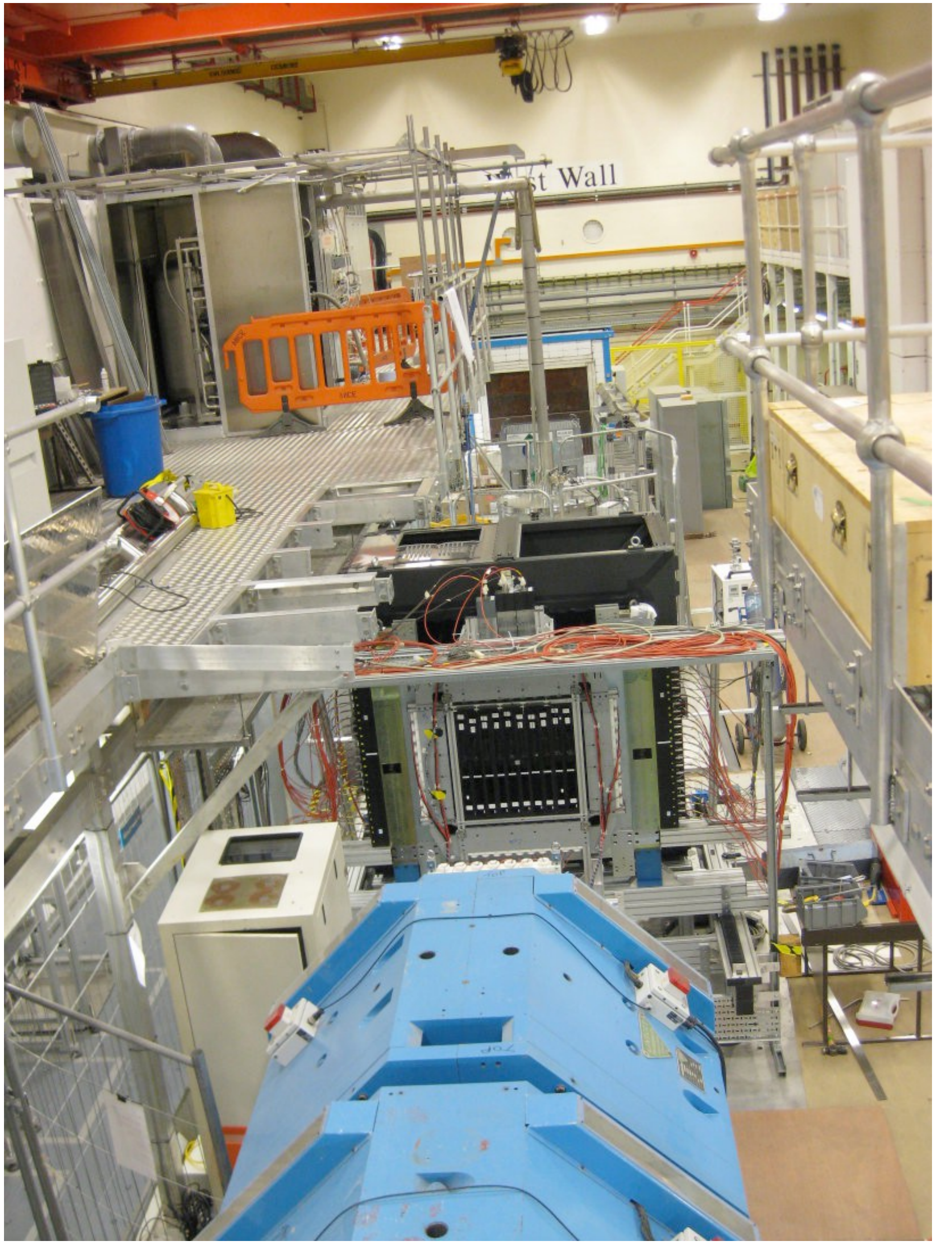
KL1 versus KL1+KL2



KL1 just contains 75 (54!) MeV .

At 100 (79!)MeV KL1 contains ½ of the energy.

But at 100 MeV only 50% of the KL1 events have signal in SW.



June 2011
KL in a new position

MICE-NOTE-DET-416
June 26, 2013

Preprint typeset in JINST style - HYPER VERSION

Measurement of the pion contamination in the MICE beam

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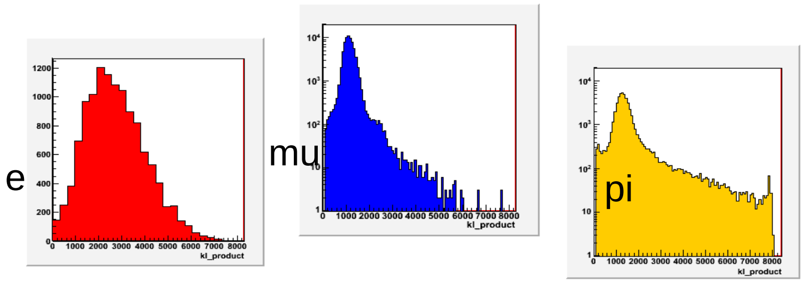
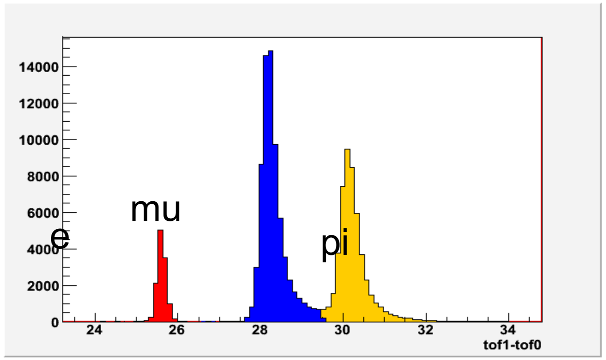
ABSTRACT: The international Muon Ionisation Cooling Experiment (MICE) will perform a systematic investigation of ionisation cooling of a ~ 200 MeV/c muon beam. A low pion contamination in the muon beam is an essential requirement for a precise measurement of ionisation cooling. In 2011, data were taken in the MICE "Step I" configuration in order to commission the particle identification detectors and to characterise the beam. The pion contamination at the entrance of the cooling channel is found to be 1% or below, as expected from Monte Carlo simulations and measured by the particle identification system using a statistical method.
This note represents an extended version of a paper in preparation on the same subject.

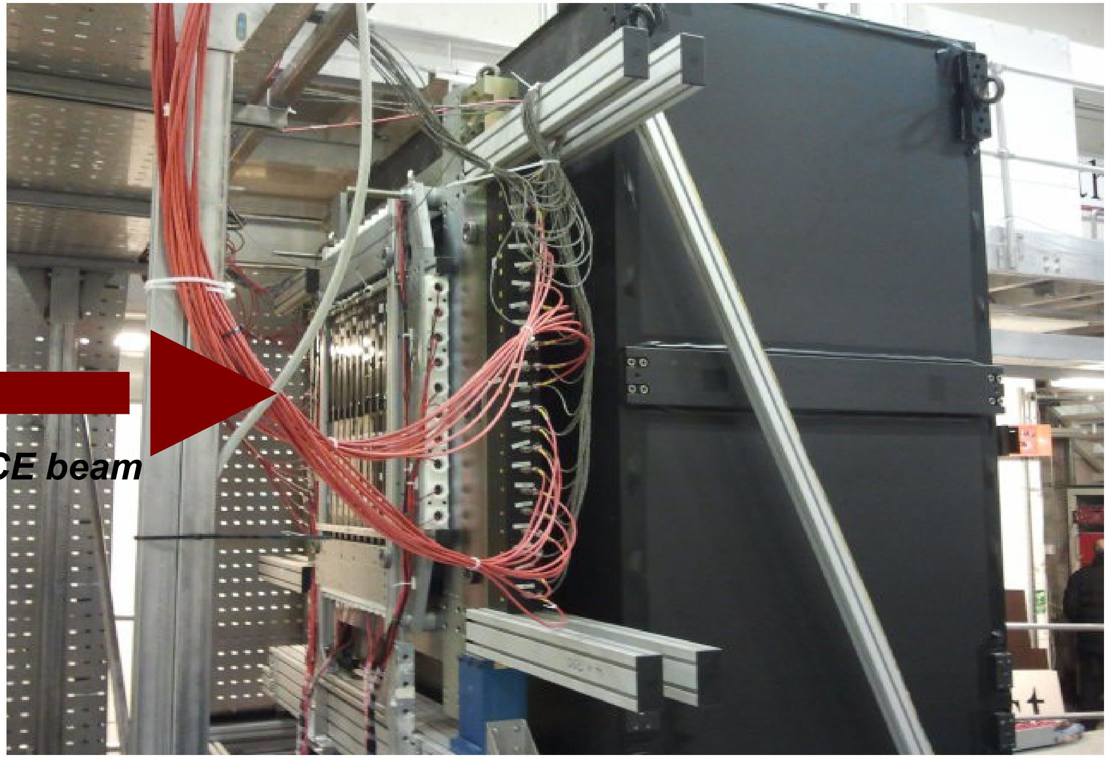
KL response to different particles
(IDed from TOF)

294 MeV @ D2

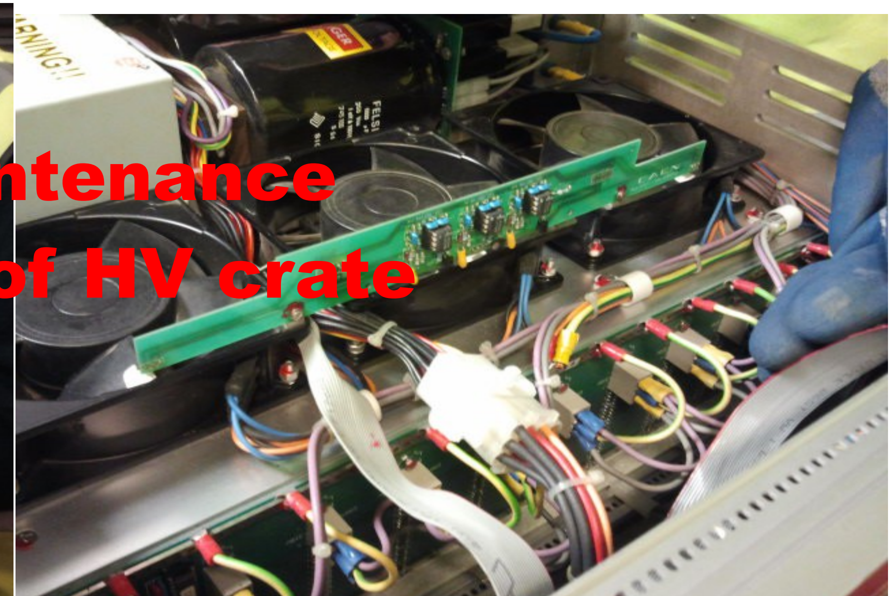




2013: KL now sandwiched between TOF2 and EMR



MICE beam



2013:maintenance
clean up of HV crate

What's left to do (HW)

- Regularly check that things keep working
  - for instance it would be good to turn on KL and its DAQ in this week end run although no meaningful data is expected
  - implement a cosmic trigger from TOF2
- Measure the position of alignment nests on KL?

- Remove steel channel plates under KL (&EMR) feet

What's left to do (SW)

- KL sw in MAUS both for reconstruction and digitisation (Mariyan)
- Digitisation needs to be tuned, work ongoing (Mariyan and John) in the context of the analysis for the PID paper (see https://micewww.pp.rl.ac.uk/issues/1473 and talk in yesterday's Analysis SW session)
  - Need to understand how low we can go with simulation built-in cuts on particle range/energy. For sure G4 defaults are too crude to reproduce tail
  - Need to tune the smearing (photoelectrons fluctuations+possible other effects) not only to reproduce the m.i.p. but also the BTF electron resolution!!!