Beam test in W-structure
Report on Micromegas data

CALICE/TB 8/12/2010
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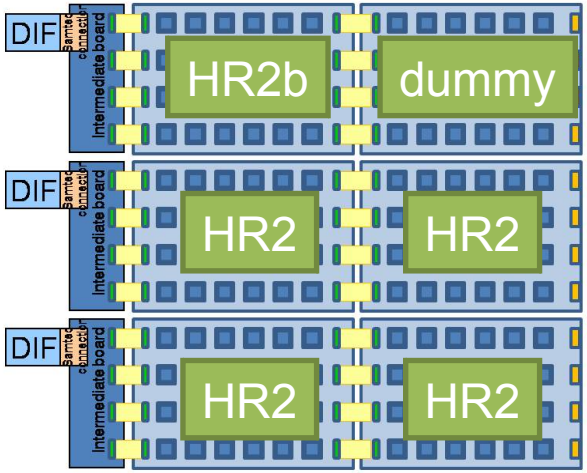
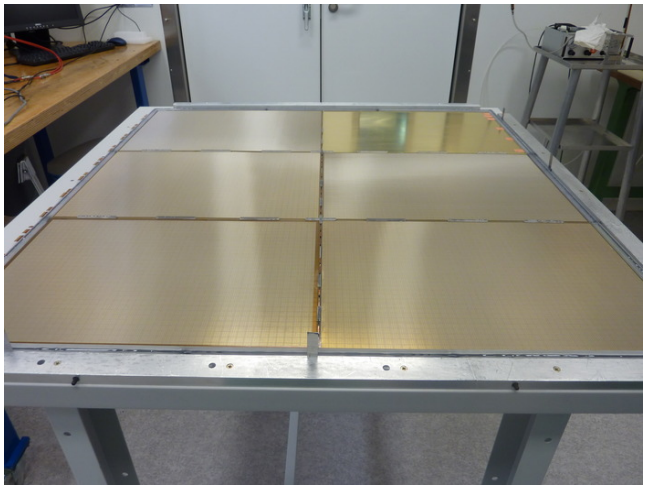
1. Detector settings
2. Synchronization
3. Standalone data
4. Next steps

Micromegas chamber

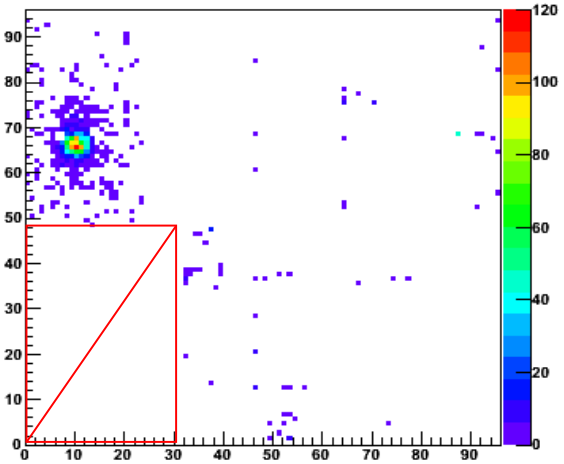
Layout



Assembly (May 2010)

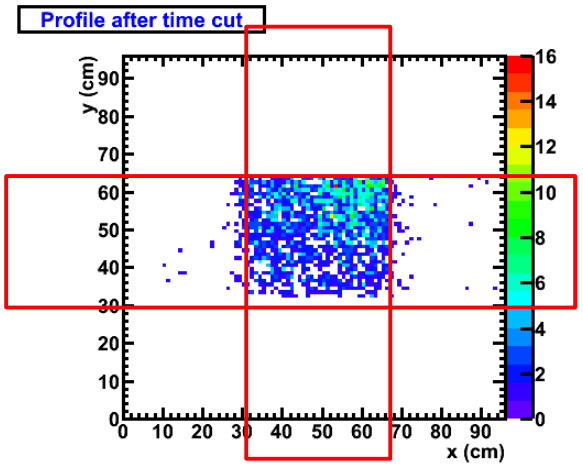


TB SPS/H4 (June/July 2010)



Muon beam profile in T7

Central slab ON only



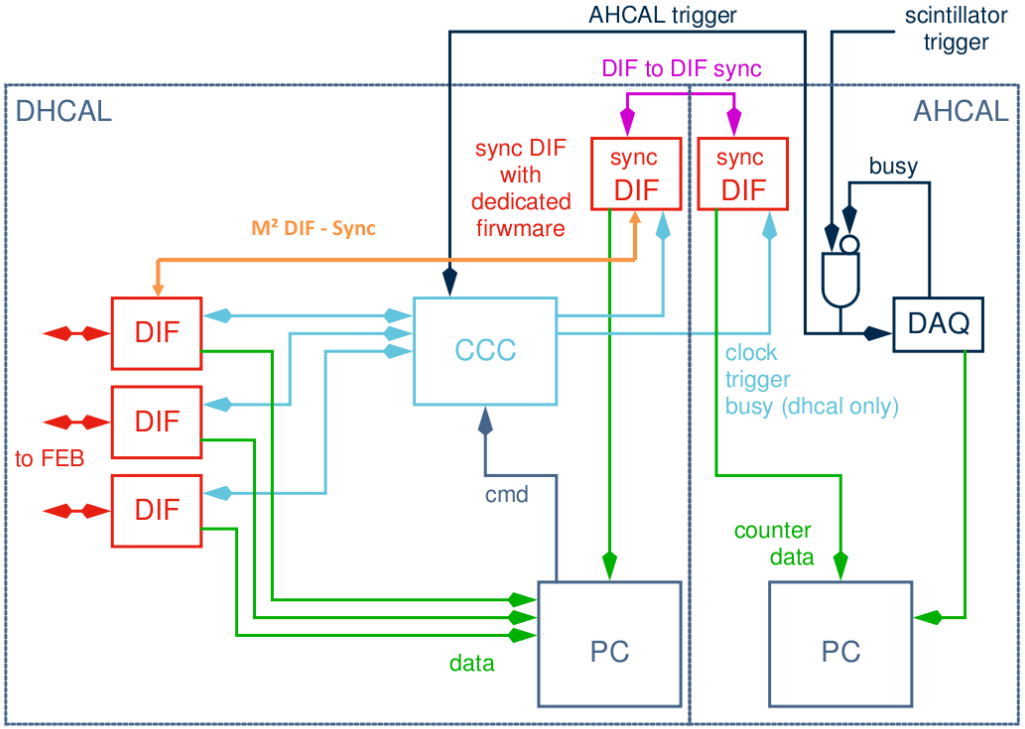
Scintillators acceptance in T7

Installation in T7 (Oct 2010) layer 31

Synchronization of AHCAL and DHCAL DIF

Common event numbering of DHCAL and AHCAL event for common offline reconstrucion
DHCAL acquisition rate lower than AHCAL
→ Use trigger from AHCAL with veto if DHCAL BUSY

Long time to have it working (great thanks to G. Vouters and P. Dauncey)
→ few last days of test period
Useful for future combined test beam



Event numbering

M² DIF	Sync DIF
Evt = 1	0xFFFFFFFA
Evt = 2	RUN number
Evt = 3	0xFFFFFFFB
Evt = 4	TNb = 11
Evt = 5	TNb = 14
Evt = 6	TNb = 15
	TNb = 17
	TNb = 19
	TNb = 20

Threshold settings

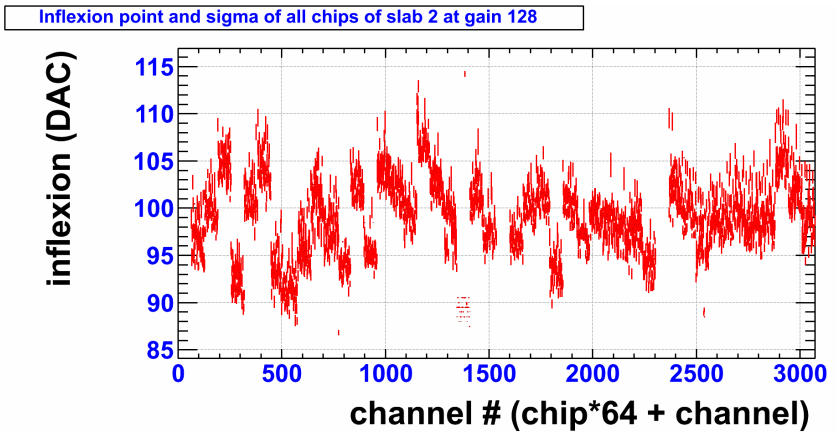
Reminder : HARDROC2 chips perform very fast shaping to detector signals
→ low efficiency with Micromegas signals (90% of signal is lost)

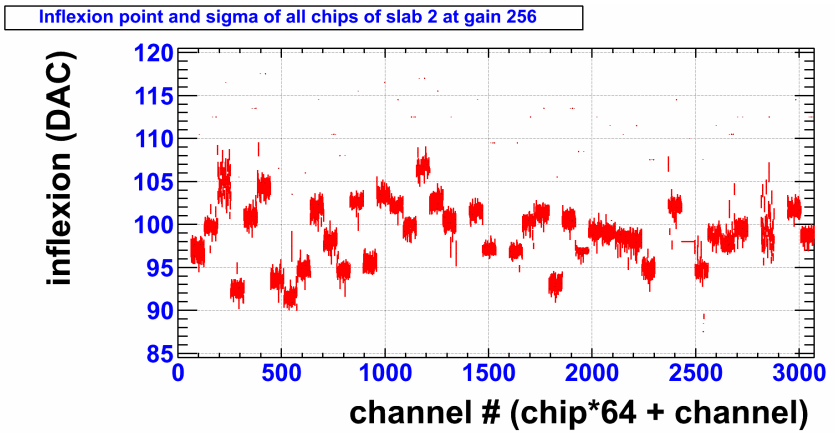
Operate detector close to spark limit (highest gas gain)

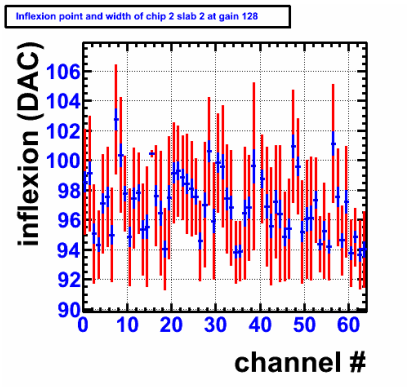
Set chip threshold just above noise
In practice : change individual channel preamplier gains to align pedestals

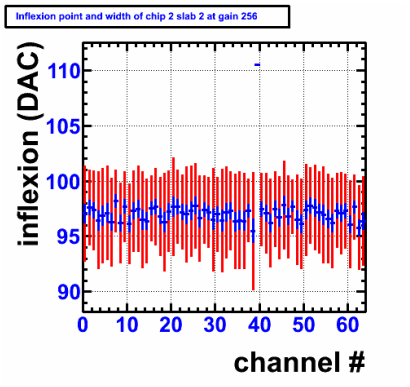
Tedious with HR2
(configuration bug fixed with HR2v2)
But possible !
→ Avoid 0101010-like SC configurations

Pedestal alignment of central SLAB chips (48-3) (~2800 channels)









Pedestal alignment of 1 chip (64 channels)

Number of recorded triggers

DAQ Synchronization started to work in the last three days

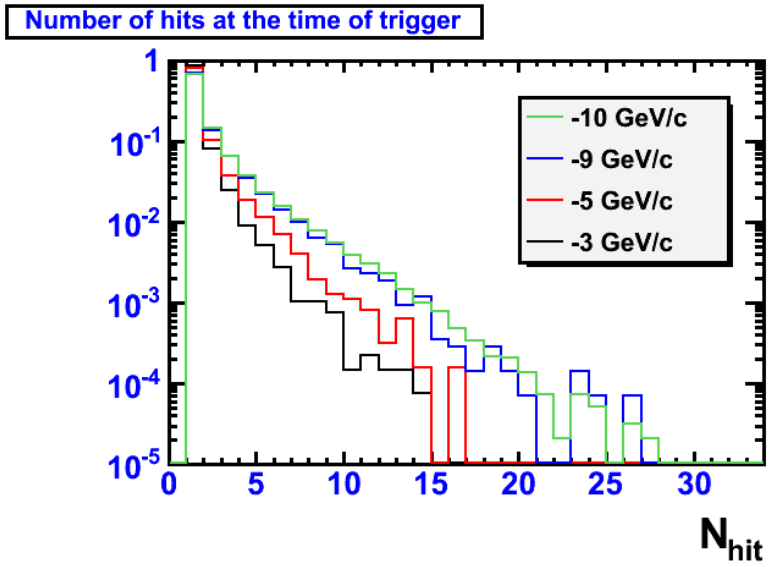
Momentum (GeV/c)	**Ntrigger**	**Synchro**
-3	270 k	240 k
-5	78 k	70 k
-9	135 k	92 k
-10	990 k	871 k
9	252 k	242 k

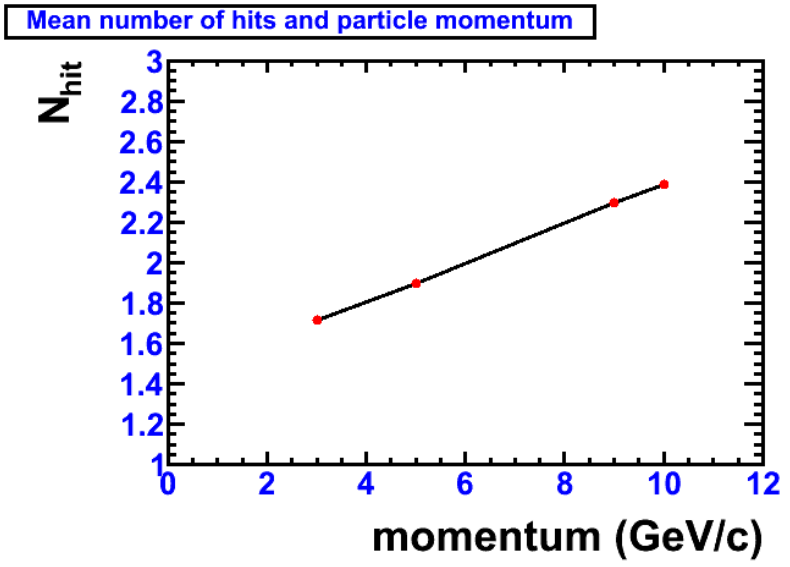
→ 1.5 million triggers with synchronization
Mainly at -10 GeV/c

Number of hits

HARDROC2 self triggered
→ record noise/physical hits between triggers
Suppress Noise with cut on time to trigger (within +/-200 ns)

Number of hits at the time of trigger
Longer tail at higher energy
Mean value scales linearly

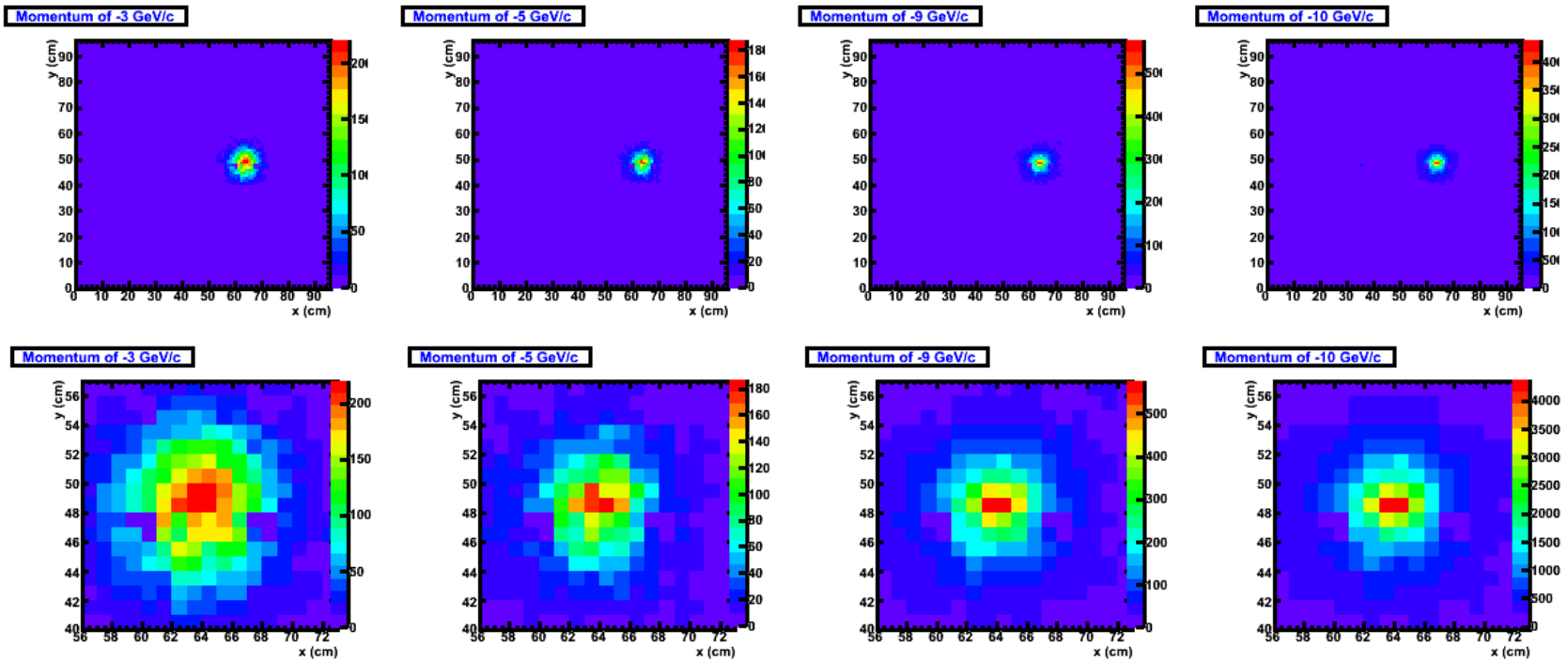




Spatial distribution of hits

Threshold very high on some chips (configuration bug of HR2)
→ Move the chamber out of the structure to use the most efficient area
→ Hit profiles show a 13 cm offset

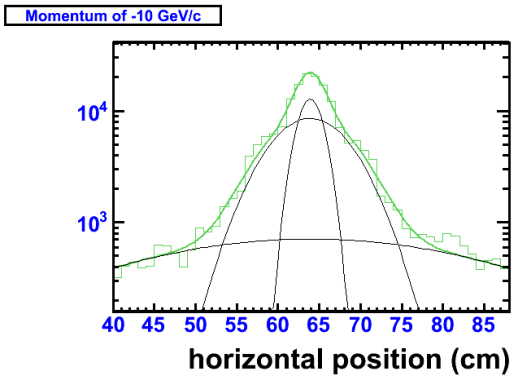
-3 GeV/c | -5 GeV/c | -9 GeV/c | -10 GeV/c

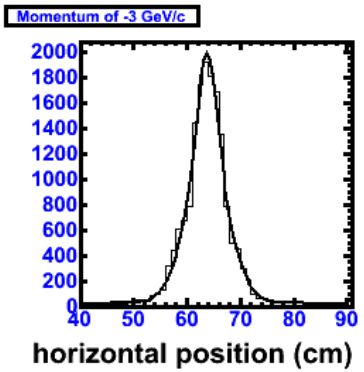


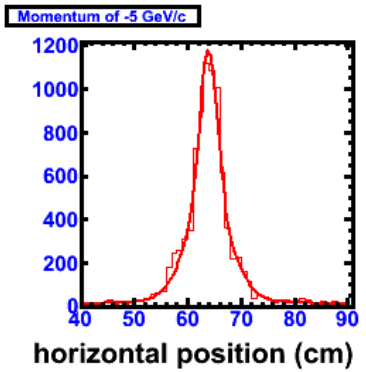
Difficult to say from the plots but the profile shape changes with energy

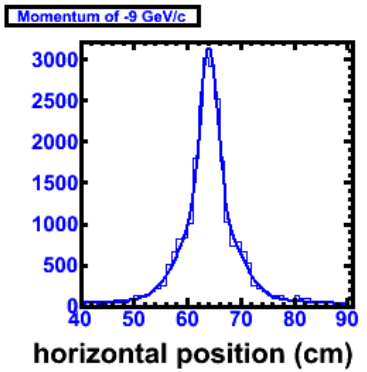
Profile shapes along horizontal direction

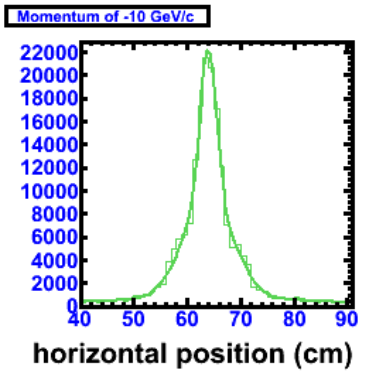
Profile shows three components
A muon core, a shower core and a shower halo
→ Fit 7 parameters of 3 gaussian functions
(same mean value)



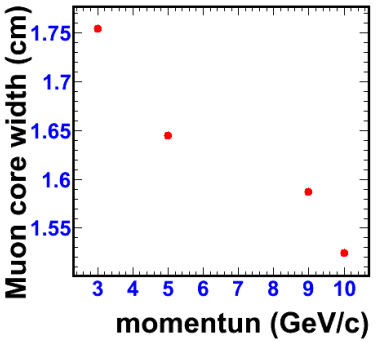


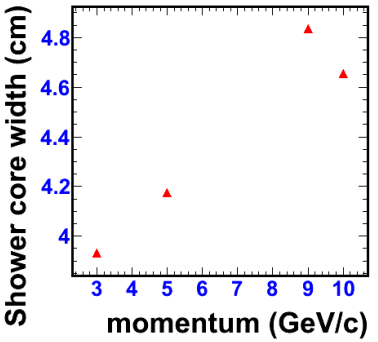






Fit works well at 4 energies
Muon core function width decreases with energy
Shower core function width increases
Shower halo function width constant





Next steps

Individual shower analysis requires information from AHCAL

Today
DHCAL data can be converted into .lcio format
AHCAL data reconstruction integrates DIF trigger counter (merci Angela, Roman and Paul)
Merging of files imminent
(with old AHCAL calibration constants)

Future analysis
Standalone → spark study (first look at data showed very few)
Combined → Longitudinal and transverse shower profiles at -10 GeV/c