

Beam test in W-structure

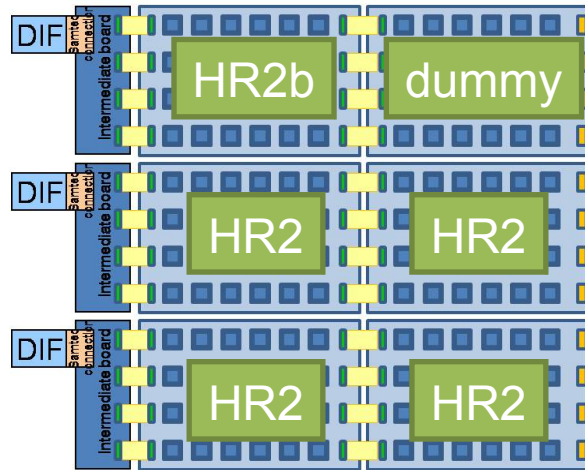
Report on Micromegas data

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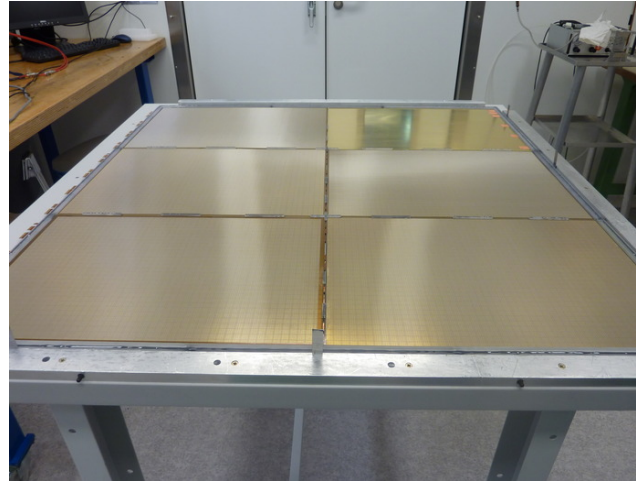
1. Detector settings
2. Synchronization
3. Standalone data
4. Next steps

Micromegas chamber

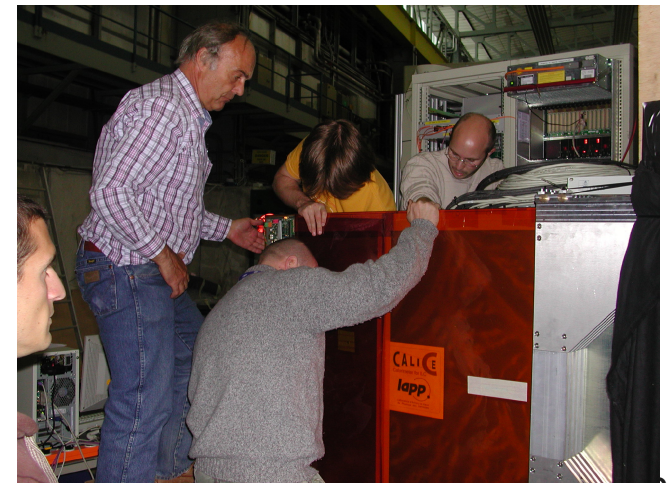
Layout



Assembly (May 2010)

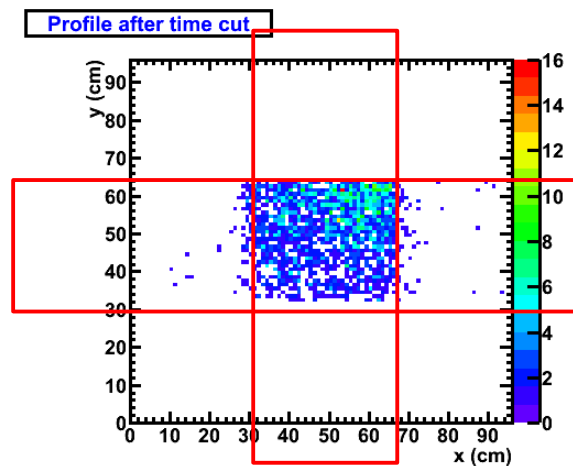


Installation in T7 (Oct 2010)
Layer 31



Muon beam
profile in T7

Central slab ON
only



Scintillators
acceptance in T7

Synchronization of AHCAL and DHCAL DIF

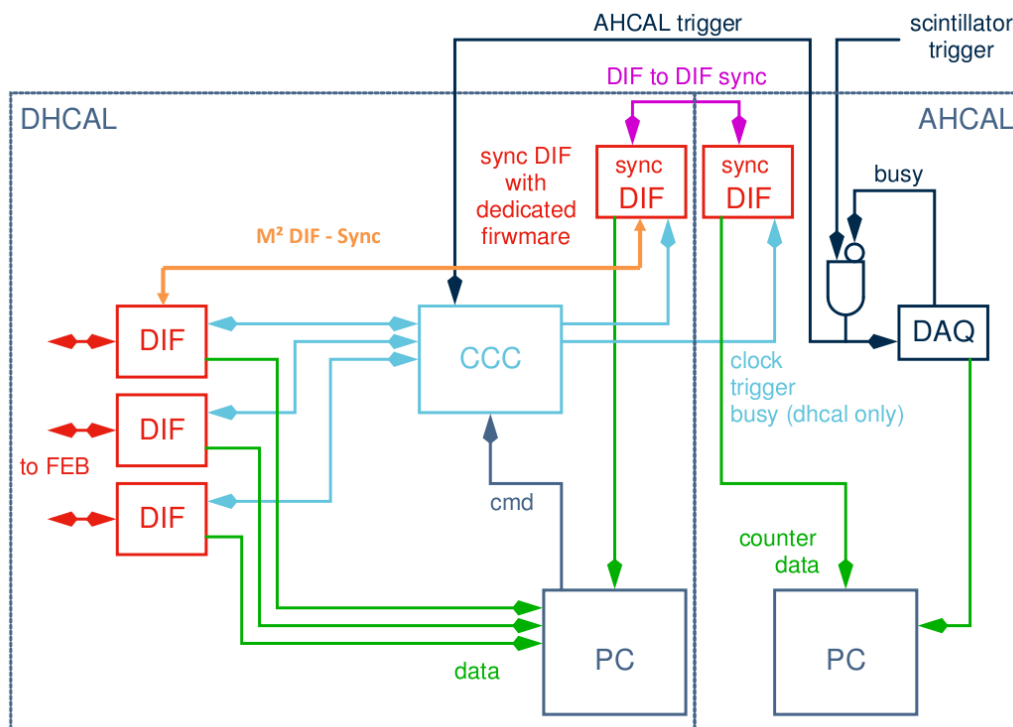
Common event numbering of DHCAL and AHCAL event for common offline reconstruction
DHCAL acquisition rate lower than AHCAL

→ 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

M ² DIF	Sync DIF
Evt = 1	0xFFFFFFFFA
Evt = 2	RUN number
Evt = 3	0xFFFFFFFFB
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)

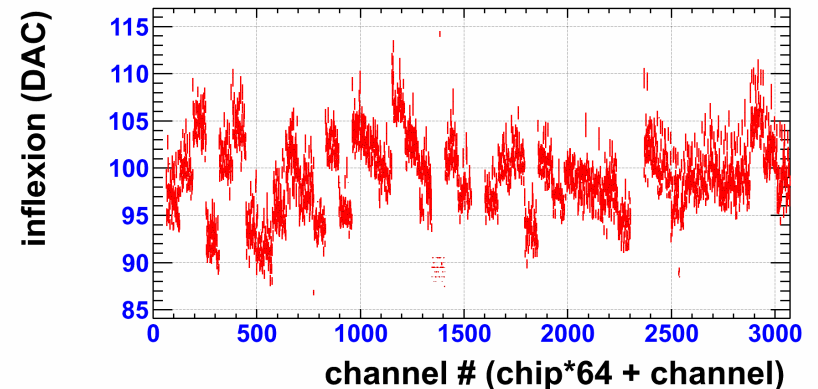
Operate detector close to spark limit (highest gas gain)

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

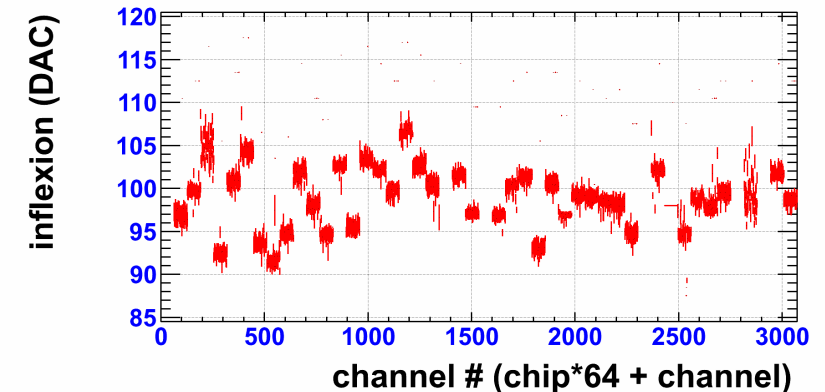
Tedious with HR2
(configuration bug fixed with HR2v2)
But possible !
→ Avoid 0101010-like SC configurations

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

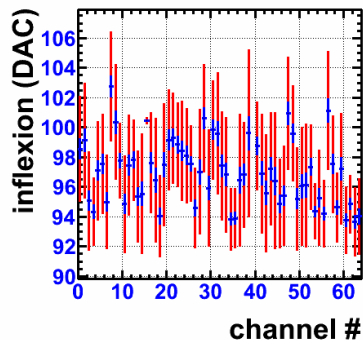
Inflexion point and sigma of all chips of slab 2 at gain 128



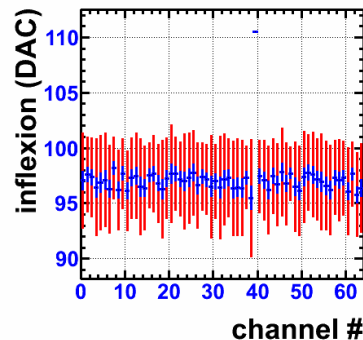
Inflexion point and sigma of all chips of slab 2 at gain 256



Inflexion point and width of chip 2 slab 2 at gain 128



Inflexion point and width of chip 2 slab 2 at gain 256



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

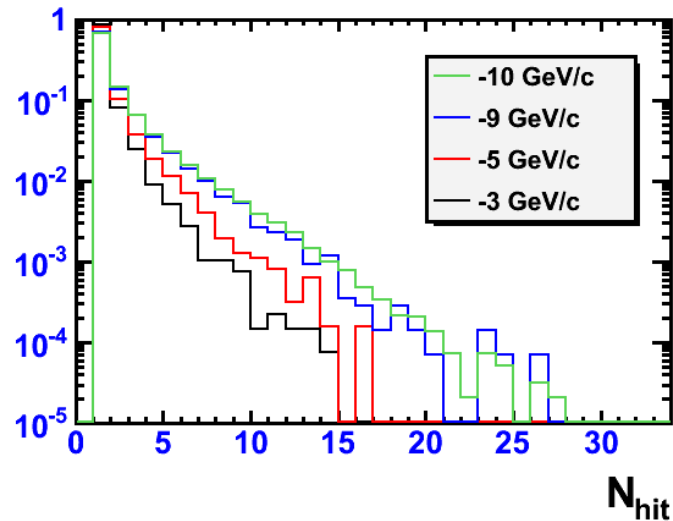
Suppress Noise with cut on time to trigger (within +/-200 ns)

Number of hits at the time of trigger

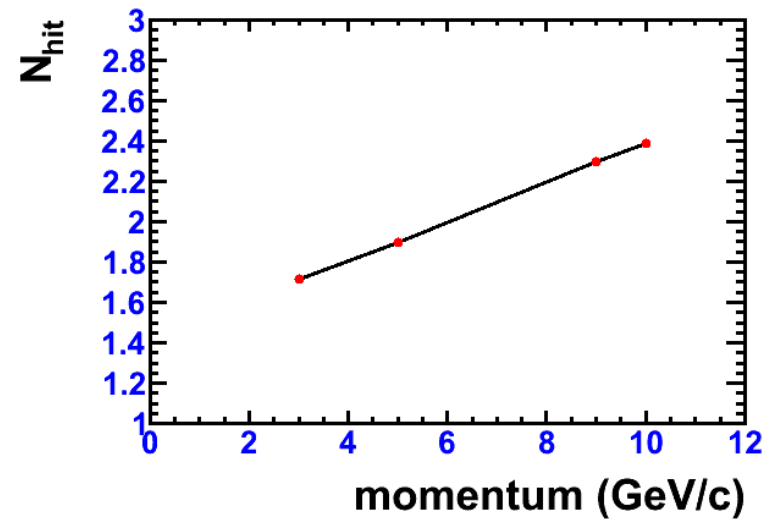
Longer tail at higher energy

Mean value scales linearly

Number of hits at the time of trigger



Mean number of hits and particle momentum

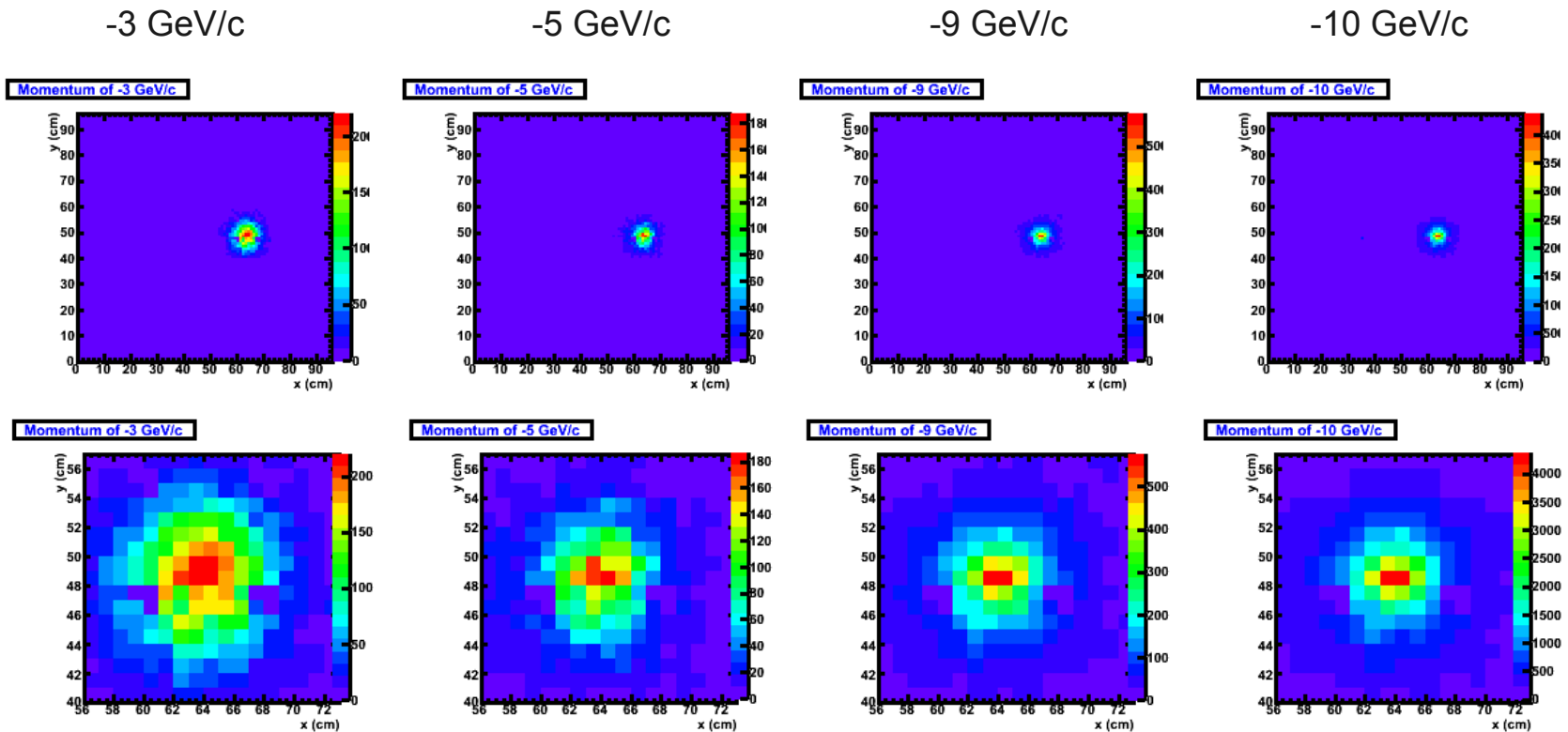


Spatial distribution of hits

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



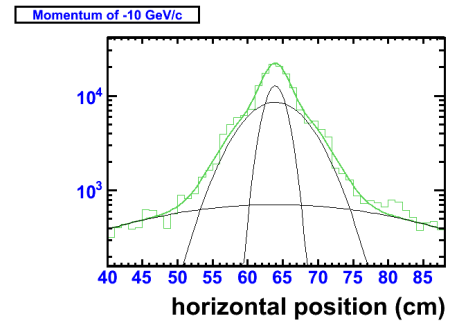
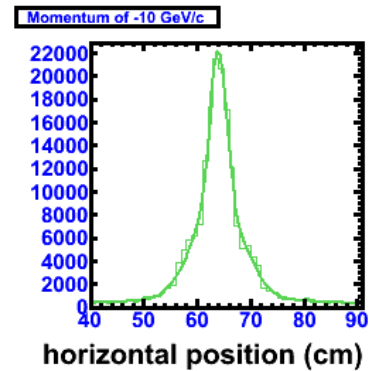
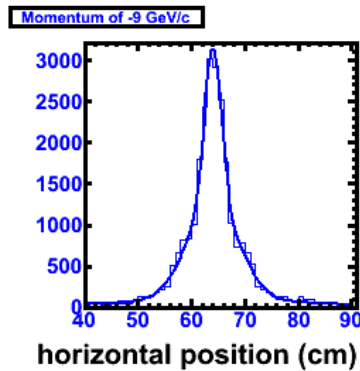
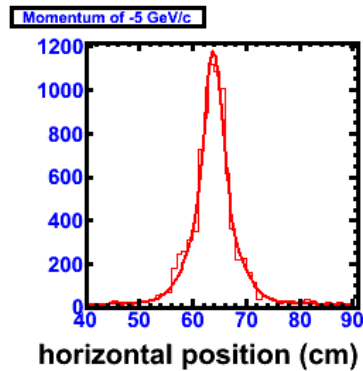
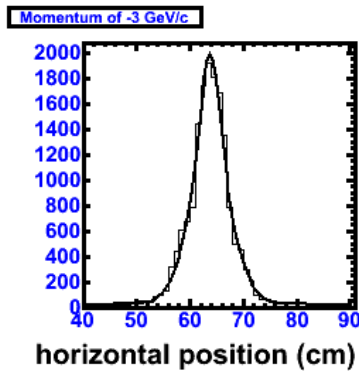
Difficult to say from the plots but the profile shape changes with energy

Profile shapes along horizontal direction

Profile shows three components

A core, a halo and a background

→ Fit 7 parameters of 3 gaussian functions
(same mean value)

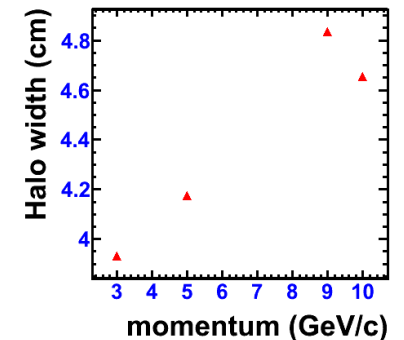
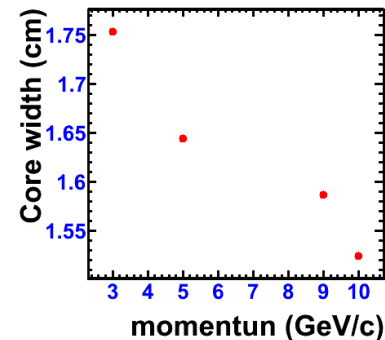


Fit works well at 4 energies

Core function width decreases with energy

Halo function width increases

Background 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