

BARREL DETECTOR

WHAT HAS BEEN DONE
AND
WHAT NEXT

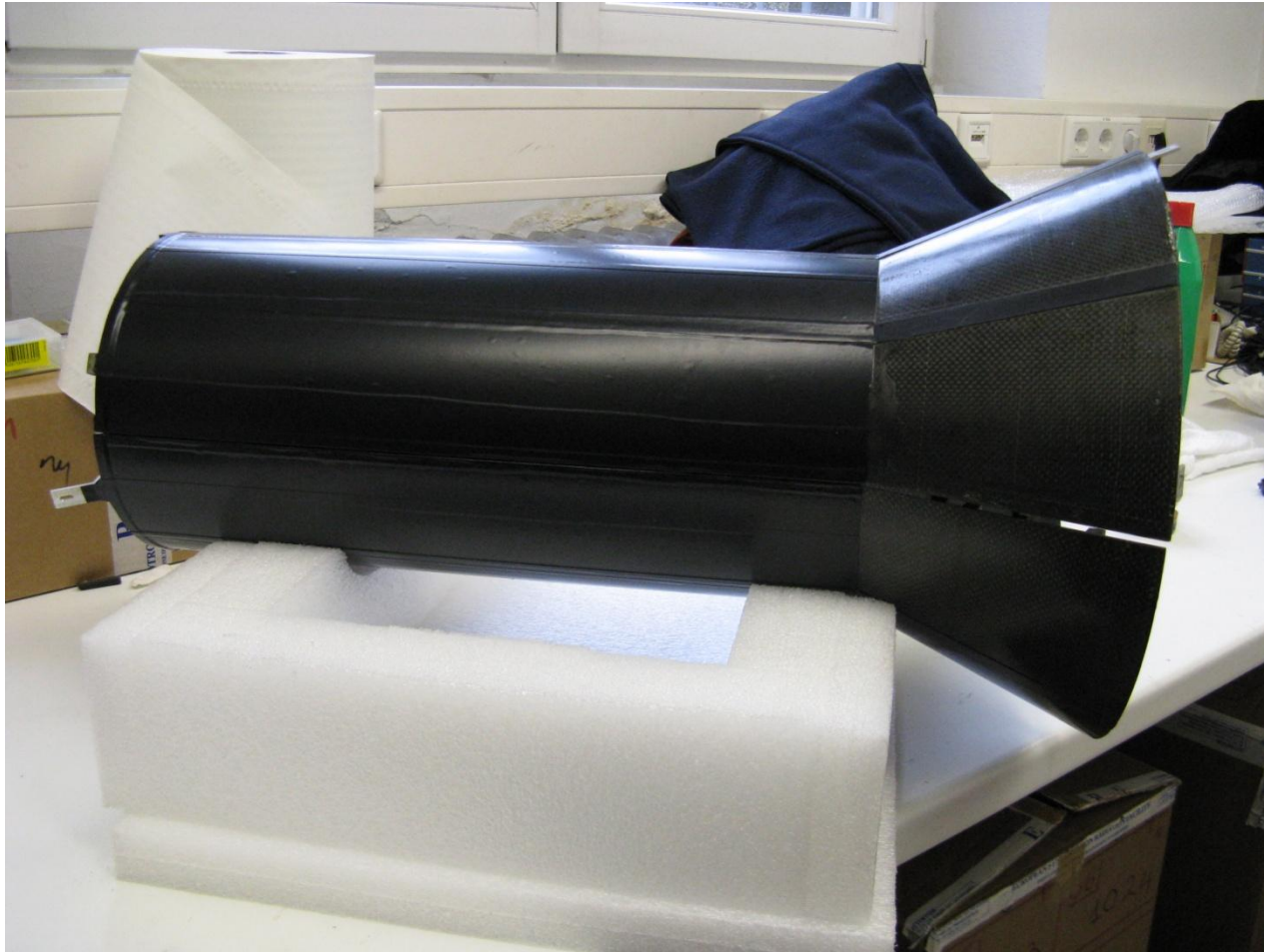


GIUGNO 2013

Barrel detector characteristics

- The barrel detector is made of 32 scintillator bars, previously Bicron BC-448 and now Eljen technology EJ-248 (represented by Scionix) with almost the same characteristic.
- The scintillators have length ≈ 430 mm, thickness ≈ 5 mm and are disposed along the axis of the beam. The granularity of the bars corresponds to the azimuthal granularity of the BGO detector surrounding the barrel.
- Each scintillator is coupled, via a light guide, with a Hamamatsu H3164-10 selected PMTs. (RISE TIME=1nS MAX, GAIN=1X10E6 MIN at 1250V, PULSE LINEARITY +/-2% MIN at 10mA)

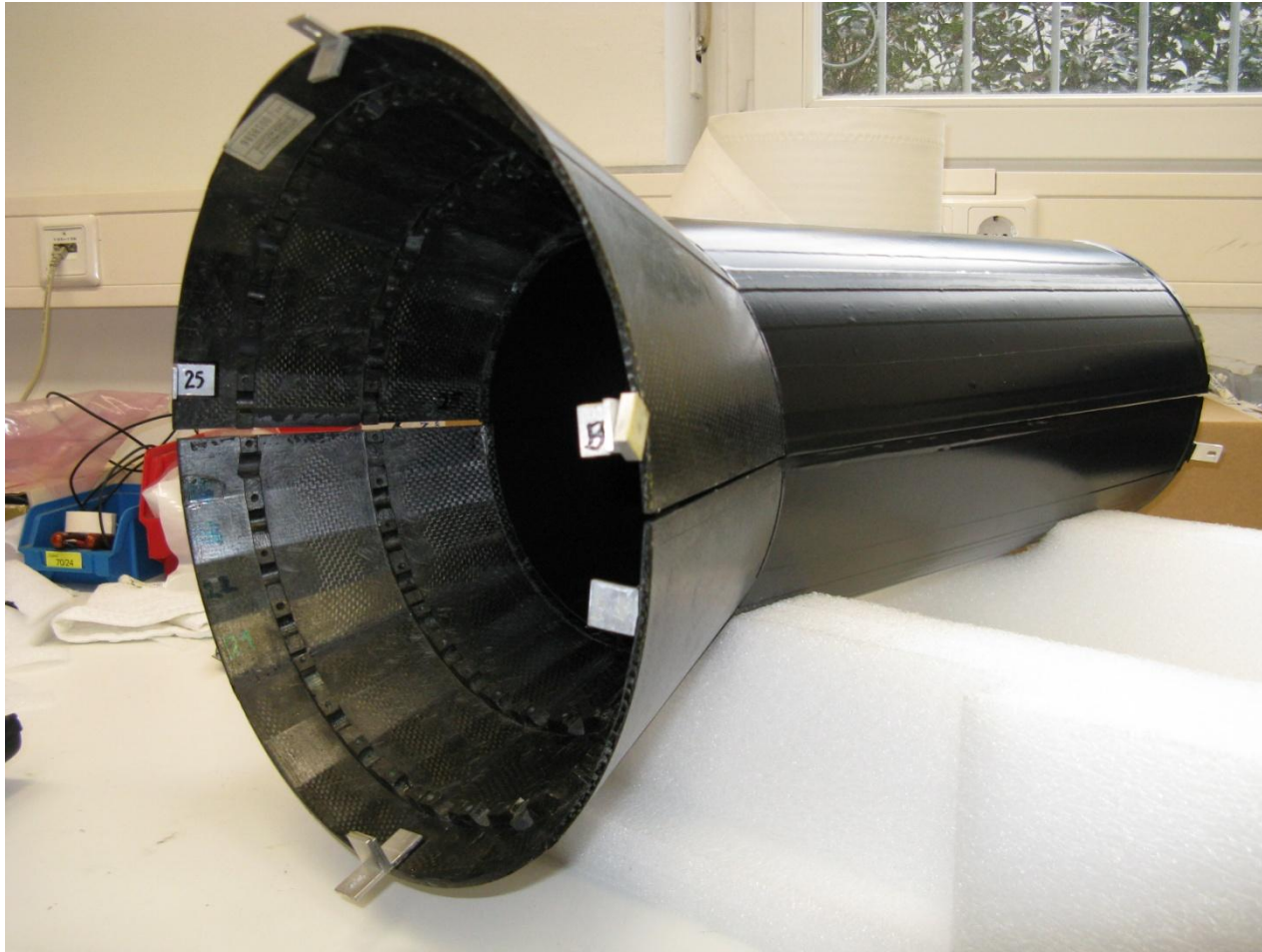
SUPPORTO BARREL



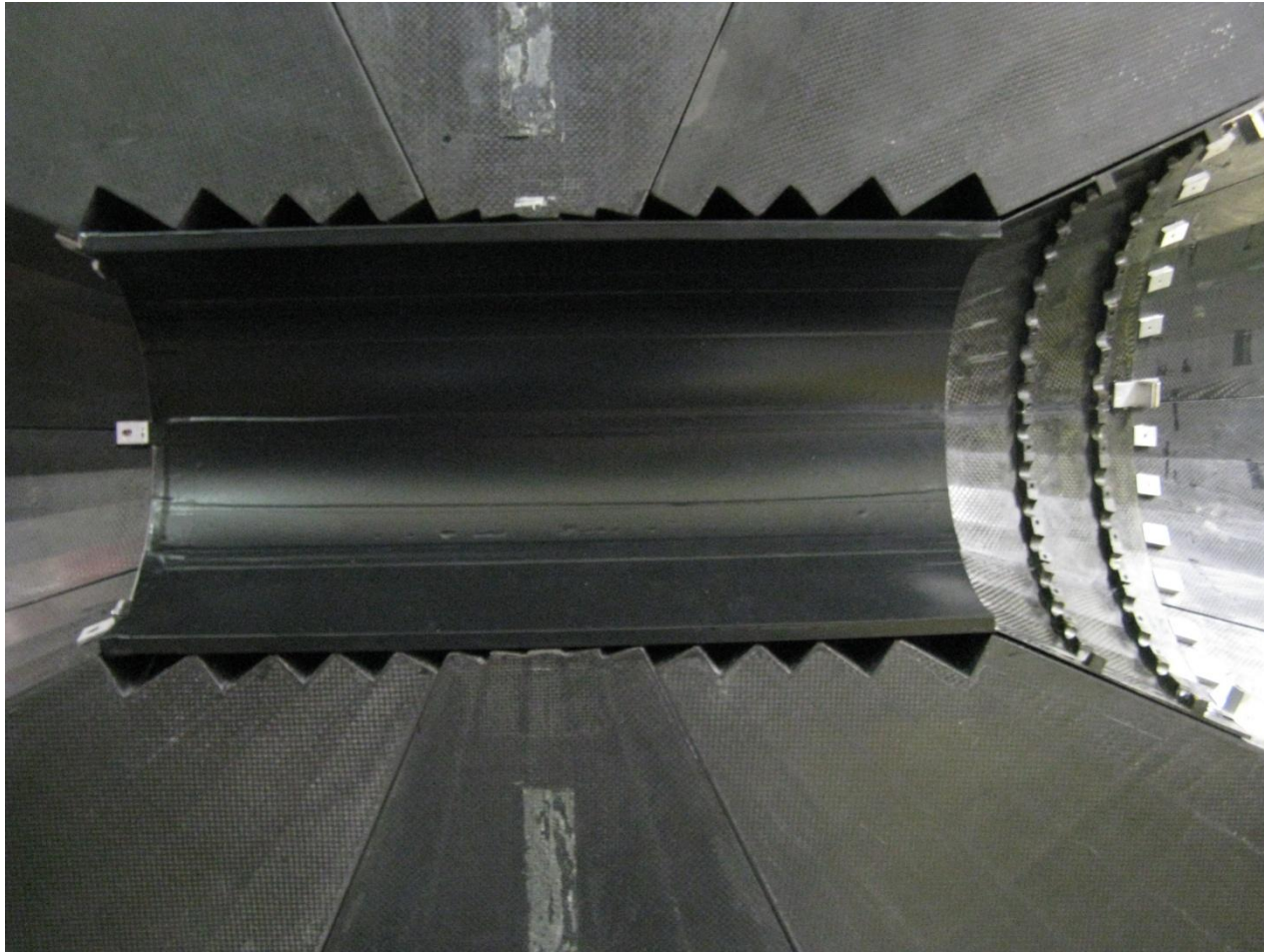
VISTA FRONTALE



FRONTALE LATERALE



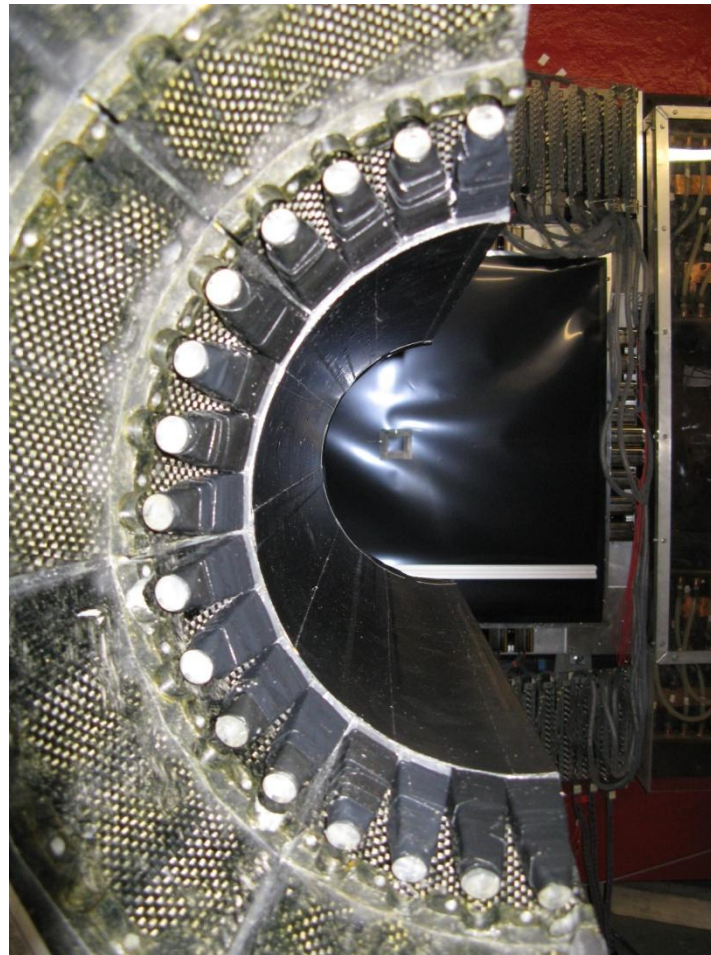
SUPPORTO BARREL IN SEDE



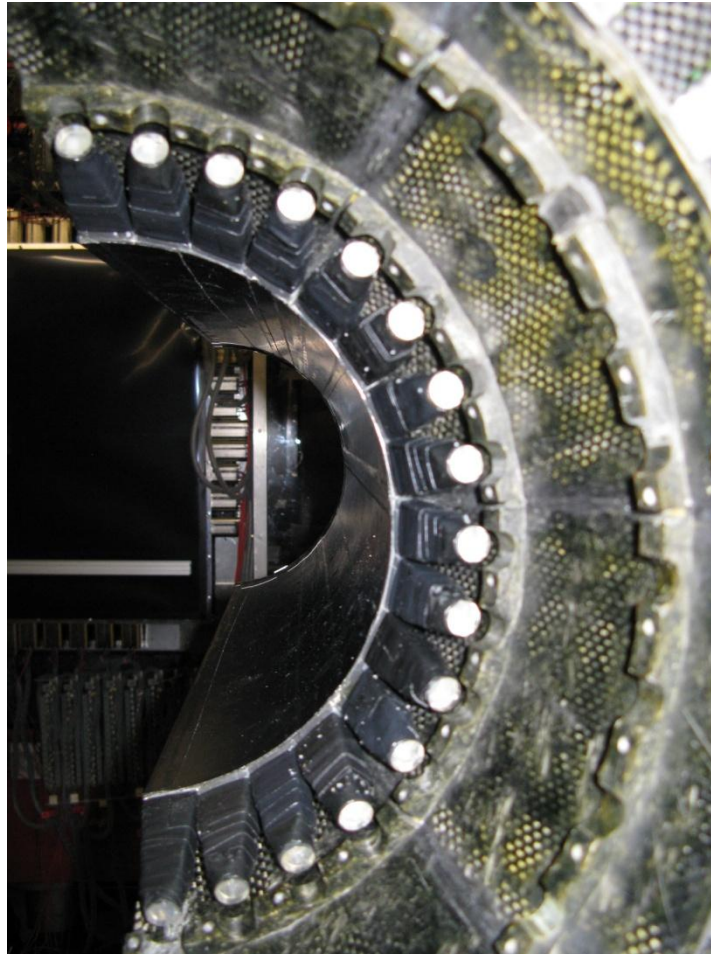
IL DECANO DEL BARREL IN AZIONE



LE 16 BARRE DEL LATO SINISTRO CON RELATIVE GUIDE DI LUCE



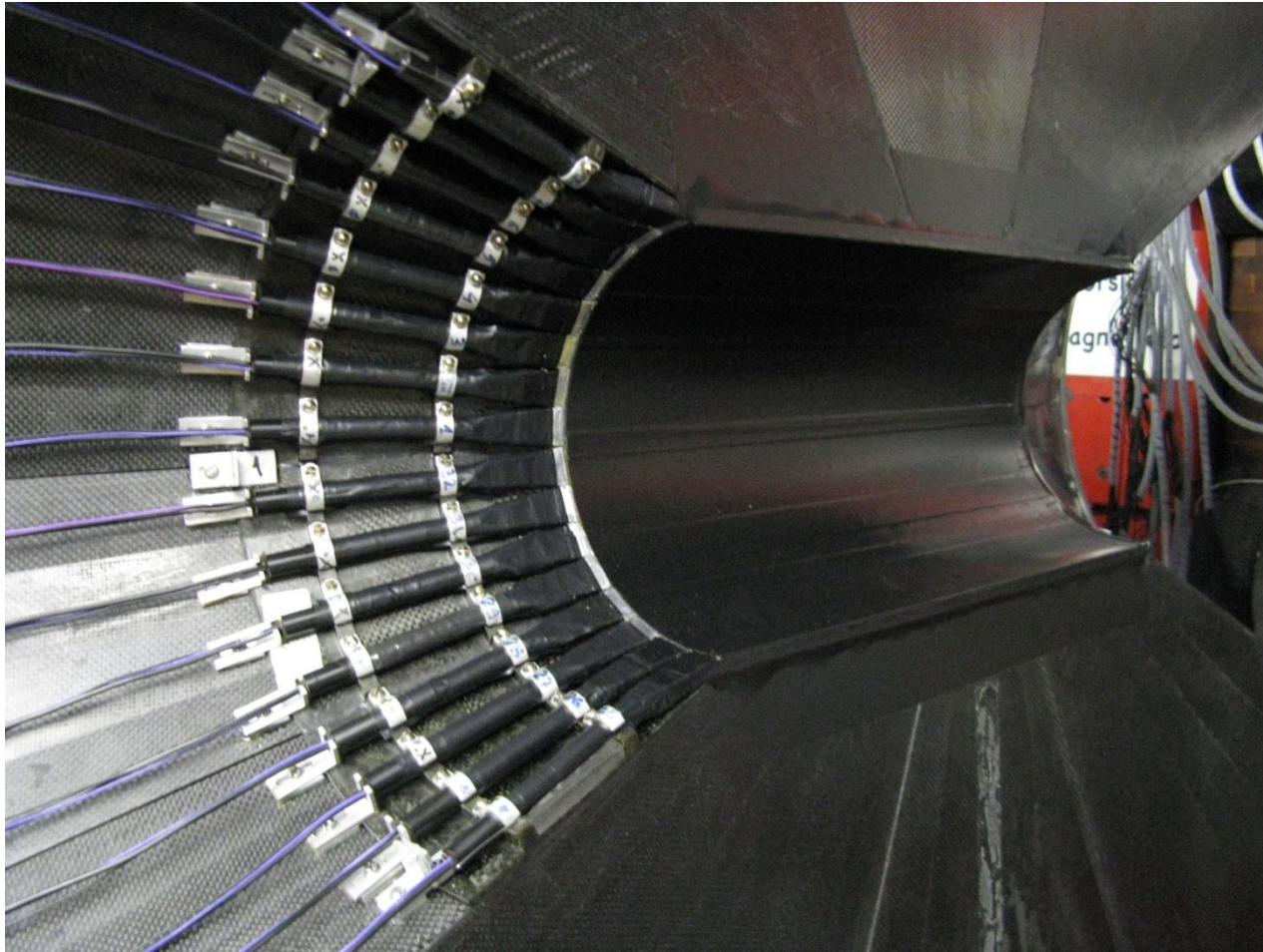
LE 16 BARRE DEL LATO DESTRO



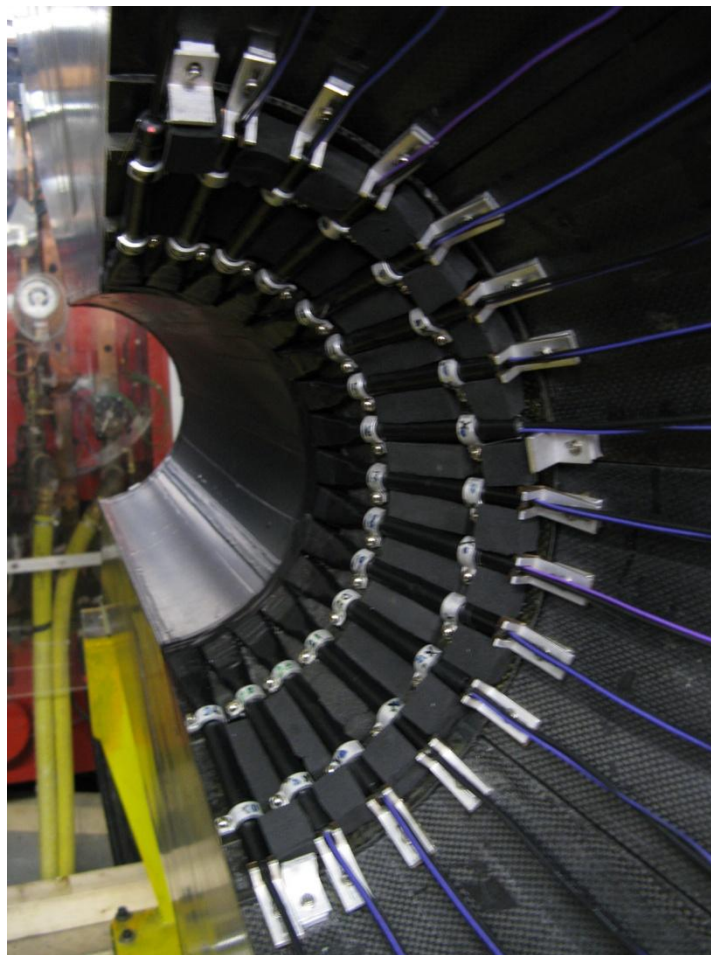
PARTICOLARE DELLE GUIDE DI LUCE



LATO SINISTRO A MONTAGGIO PMT ULTIMATO



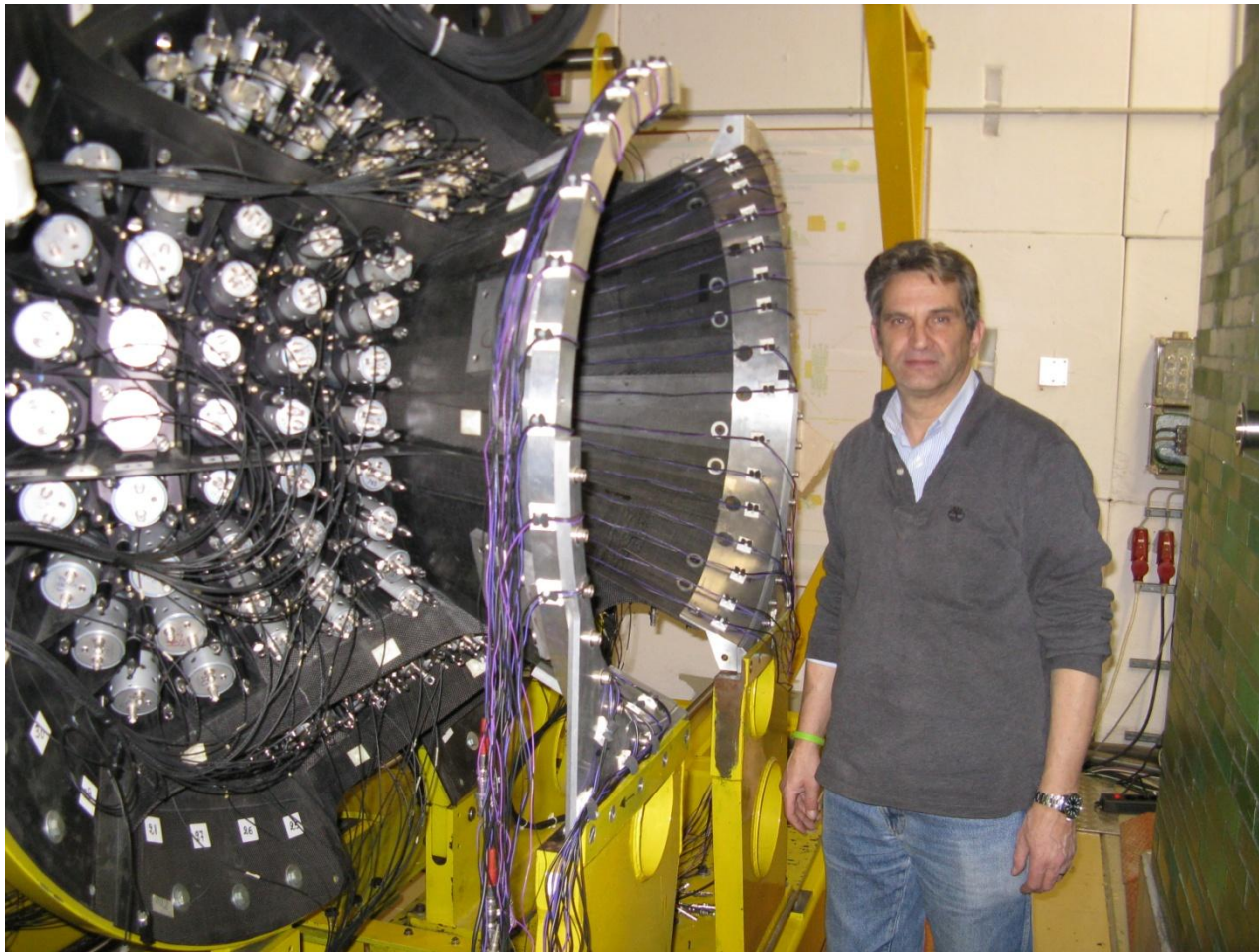
LATO DESTRO ULTIMATO



ULTIMI RITOCCHI DEL DECANO



IL BARREL E' PRONTO

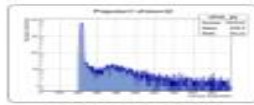


- The H.V. power supply is for the moment provided by two cards of the old GRAAL crates C.A.E.N. SY403 (64 Channels), still in use for some of the BGO channels.
- We have already ordered from CAEN 2 new HV cards 24 channel each (A1535SN) to replace the old ones. The cards are already in Bonn but there are no free slots in the HV crates actually installed.
- We need urgently that the new HV crate that will be used for the MRPC would be sent to Bonn and installed.

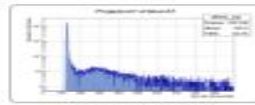
- The detector has been equipped with a two 16-channel Multievent QDC (CAEN V792N) and a 128-channel MultiHit TDC (CAEN V1190A) for amplitude and time read-out, and inserted in the general acquisition.
- The analogic signal of each bar is sent to a FanInFanOut, located on the platform of the electronics, and split into two signals. The first signal is delayed by 700 ns, for the synchronization with the trigger, and sent to one channel of the QDC. The second signal is discriminated, adapted and sent to one channel of the TDC.
- Signals for each bar are roughly equalized with a Sr-90 source

SOME RESULT FROM THE JUNE 2012 TEST BEAM ADC SPECTRA

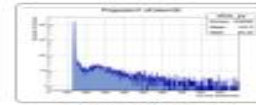
NO SIGNAL !!



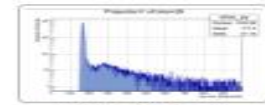
Bar_1.png



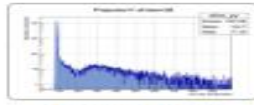
Bar_2.png



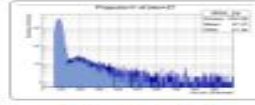
Bar_3.png



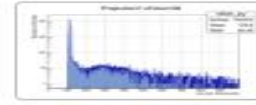
Bar_4.png



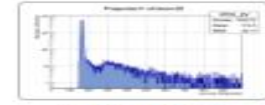
Bar_5.png



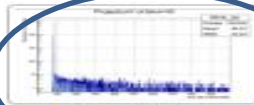
Bar_6.png



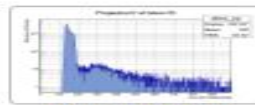
Bar_7.png



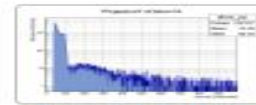
Bar_8.png



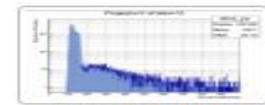
Bar_9.png



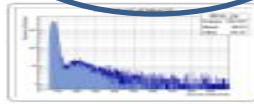
Bar_10.png



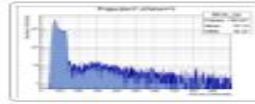
Bar_11.png



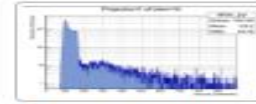
Bar_12.png



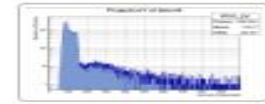
Bar_13.png



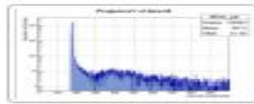
Bar_14.png



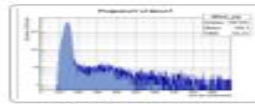
Bar_15.png



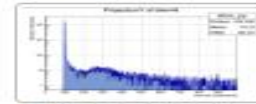
Bar_16.png



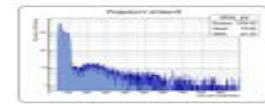
Bar_17.png



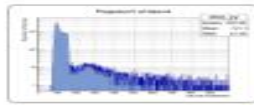
Bar_18.png



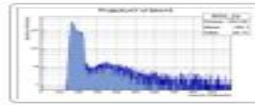
Bar_19.png



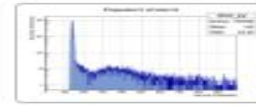
Bar_20.png



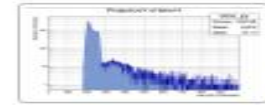
Bar_21.png



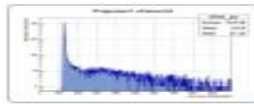
Bar_22.png



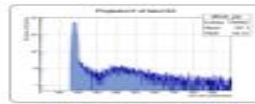
Bar_23.png



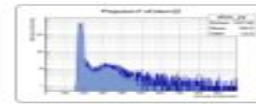
Bar_24.png



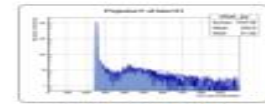
Bar_25.png



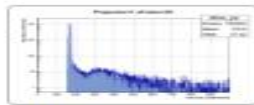
Bar_26.png



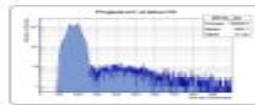
Bar_27.png



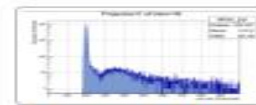
Bar_28.png



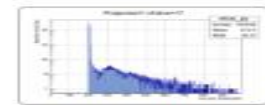
Bar_29.png



Bar_30.png



Bar_31.png



Bar_32.png

- In un successivo intervento in nov. 2012 si è verificato che l'assenza di segnale sulla barra 9 era dovuto ad un guasto del corrispondente canale di ADC.
- L' ADC è già ritornato a Bonn dopo la riparazione in CAEN.
- Vista l'affidabilità di questi ADC si è già provveduto ad acquistarne uno di scorta, anch'esso già disponibile a Bonn.

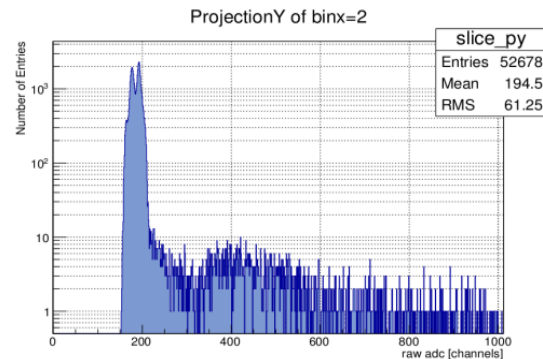
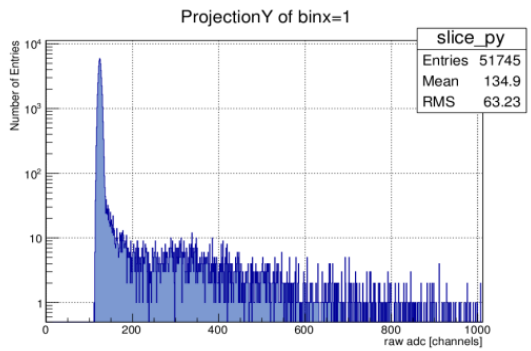
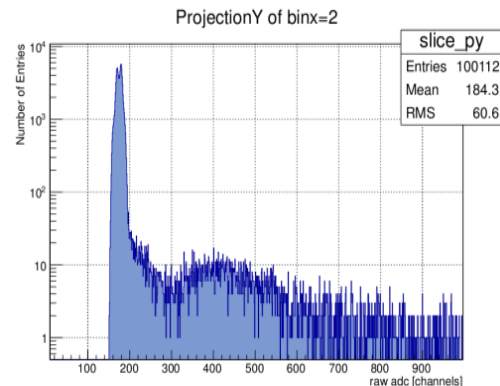
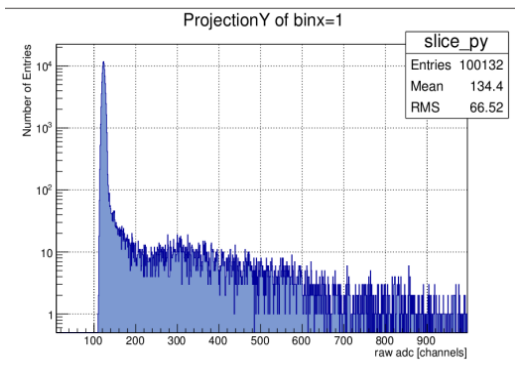
- Questi spettri sono stati ottenuti utilizzando dei low threshold discriminator.
- In un successivo intervento (Nov. 2012) sono stati installati in sostituzione 2 Constant Fraction Discriminator Lecroy 3420 da 16 canali ciascuno.
- Questi CFD sono quelli già usati a GRAAL per il Barrel ed hanno necessitato anche l'installazione di un crate Camac apposito.

Monday June 18th

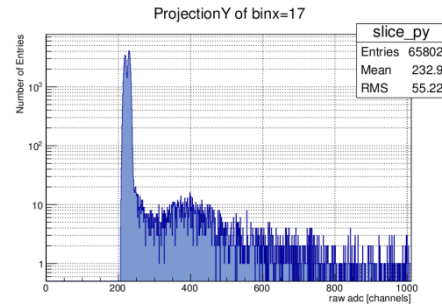
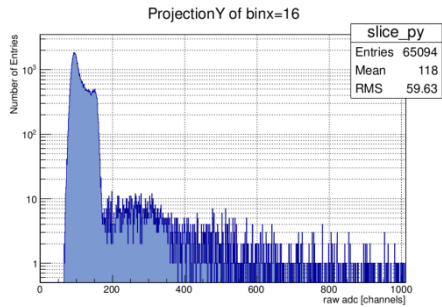
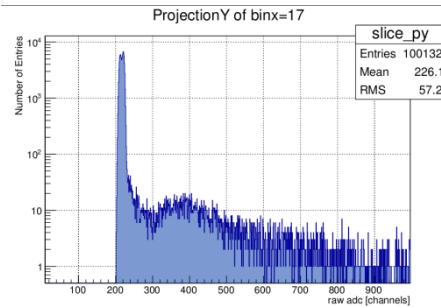
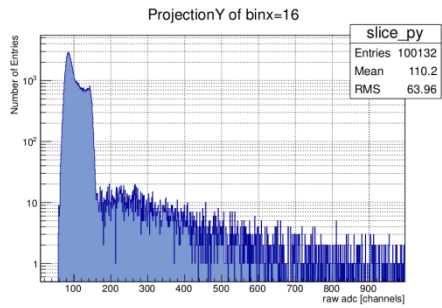
BARREL WITH MAGNETIC FIELD (940 A-0.311 T)

Comparison of the ADC behaviour with and without Magnetic field

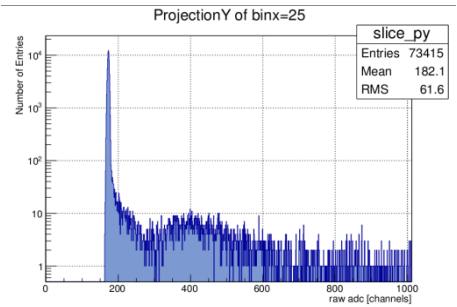
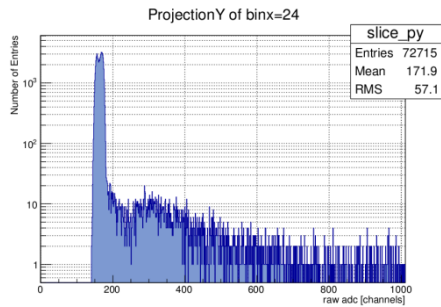
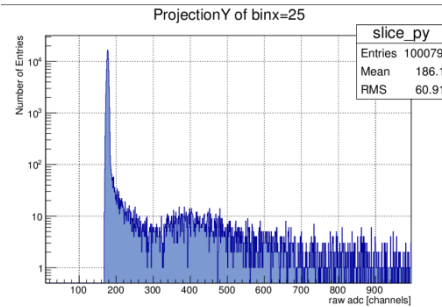
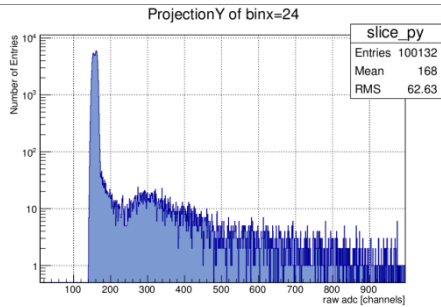
No visible effect due to the magnetic field.



Bar 1 No field Top - with field Bottom Bar 2



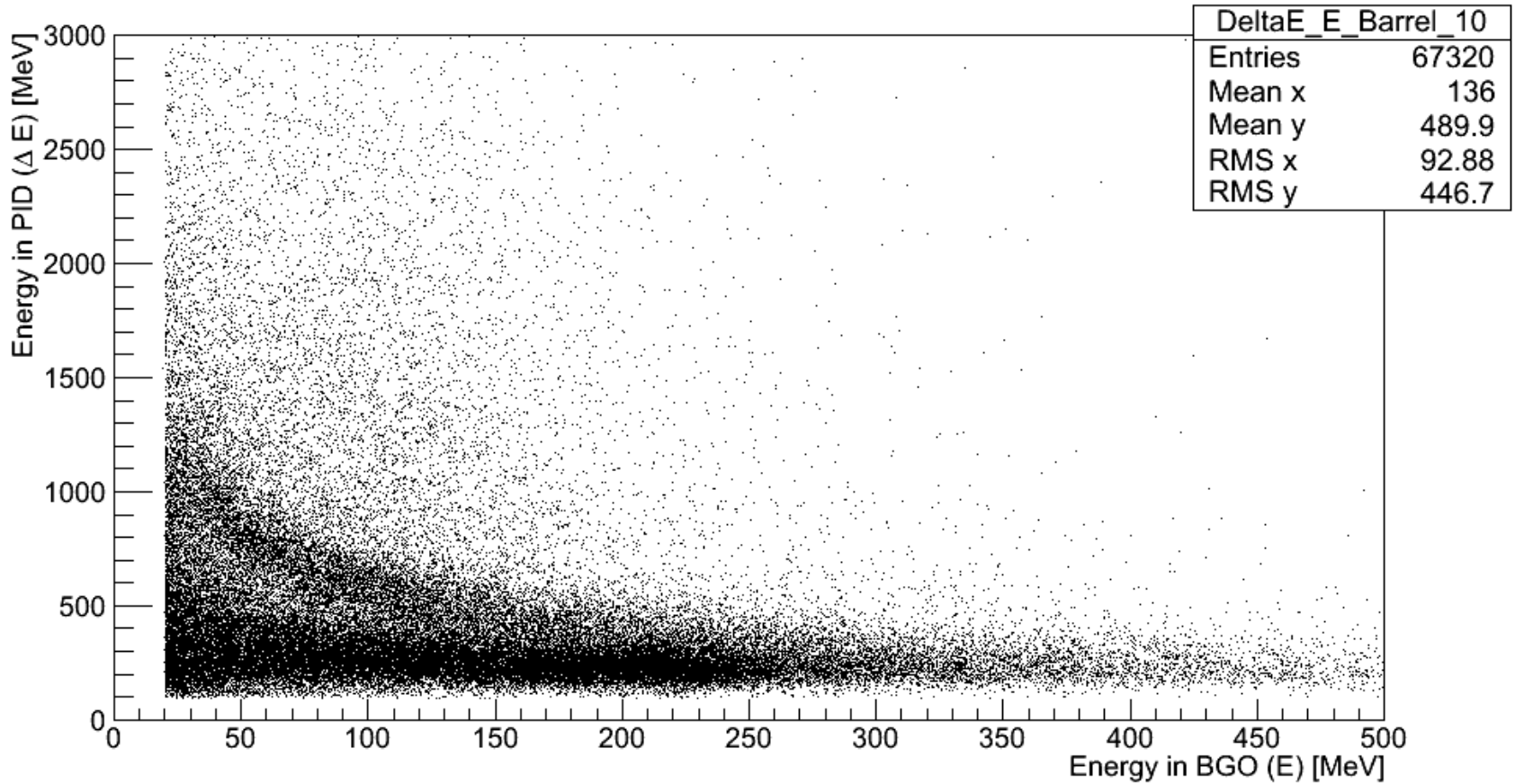
Bar 16 no field top – with field bottom Bar17



Bar 24 no field top – with field bottom Bar 25

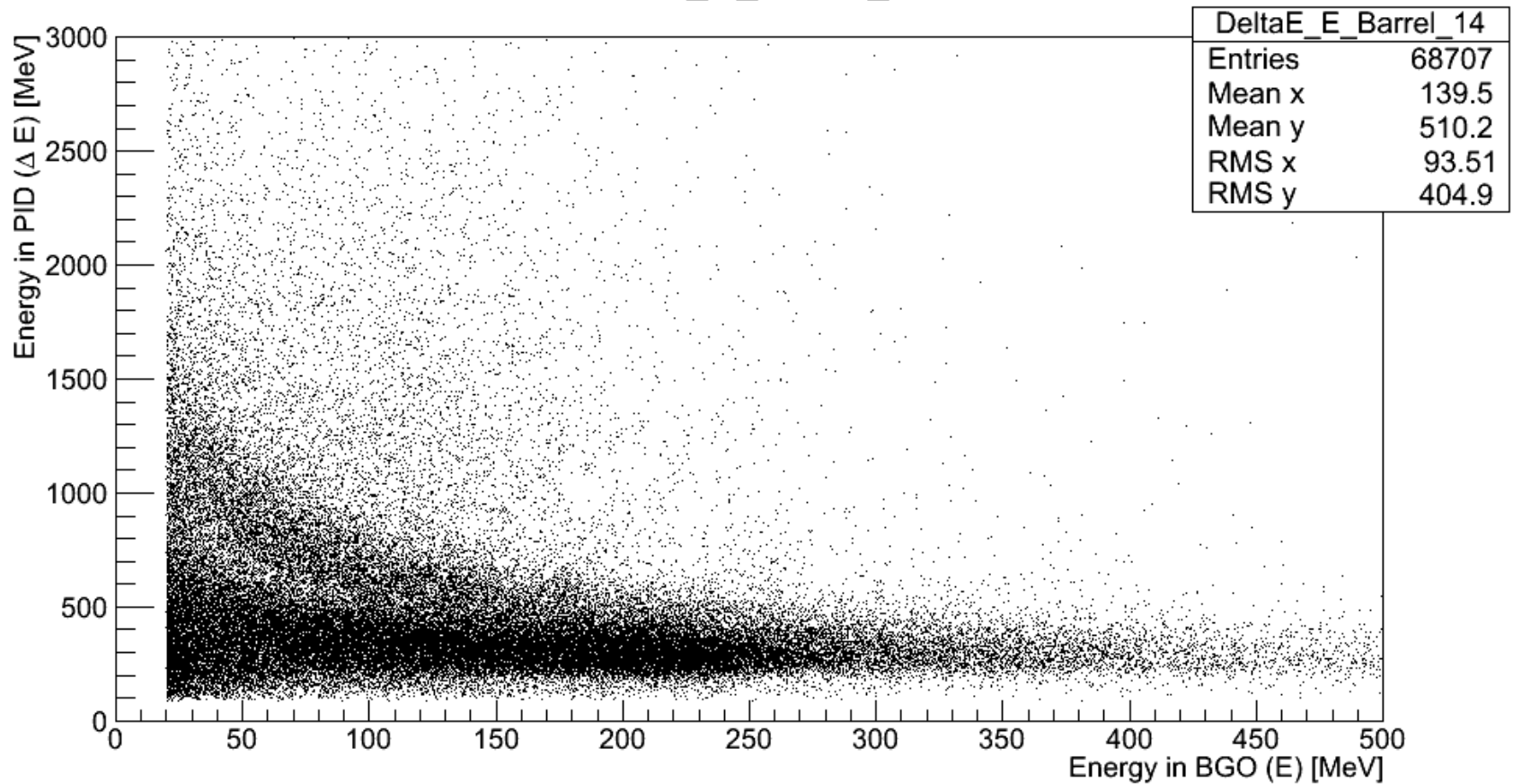
dE/dx Barrel vs E in BGO

DeltaE_E_Barrel_10



dE/dx Barrel vs E in BGO

DeltaE_E_Barrel_14



TO BE DONE

- HV
- Come già ricordato in precedenza abbiamo già acquistato 2 nuove schede di HV (48 canali) che però necessitano di un nuovo crate per essere montate.
- Le schede verranno montate e testate sul nuovo crate HV delle MRPC non appena quest'ultimo sarà disponibile a Bonn (QUANDO ????)

SCINTILLATORI

- Fra i 32 scintillatori attualmente montati nel Barrel ce ne sono alcuni (4-5) visibilmente criccati che verranno sostituiti con degli scintillatori di scorta mai usati ma risalenti ai tempi del GRAAL. Ciò avverrà nel prossimo intervento previsto in Settembre.
- Nel frattempo abbiamo deciso di ordinare a Scionix una sostituzione completa (32 barre) degli scintillatori. L'ordine (5.5-6 keuro) verrà suddiviso tra la Sezione di Pavia (3.5 ?) e Sanità (2-2.5 max).
- Gli scintillatori nuovi che arriveranno si installeranno solo all'inizio di una vera presa dati per evitare danneggiamenti inutili.

PMT

- I PMT del Barrel (Hamamatsu H3164-10 sel) sono la componente più costosa del rivelatore stesso (tra 0.9 e 1 keuro ciascuno a seconda del quantitativo ordinato).
- Attualmente vi sono almeno 3-4 PMT esauriti da sostituire e non abbiamo più scorte.
- Abbiamo fatto un ordine congiunto fra 3 sezioni (Torino, Sanità e Frascati) per l'acquisto di 13 PMT che dovrebbero arrivare a Bonn nella prima metà di Settembre.
- Nel prossimo intervento a Settembre verranno sostituiti i PMT esauriti