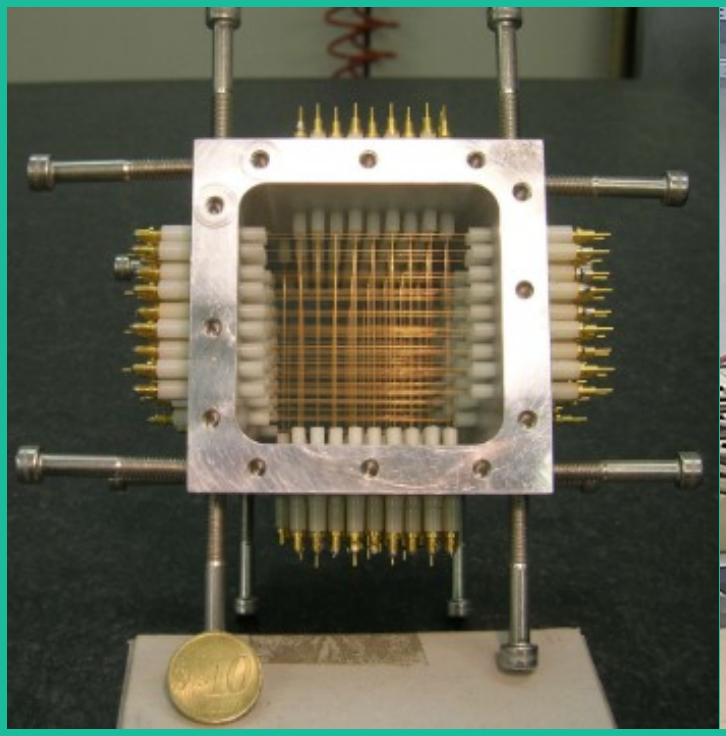
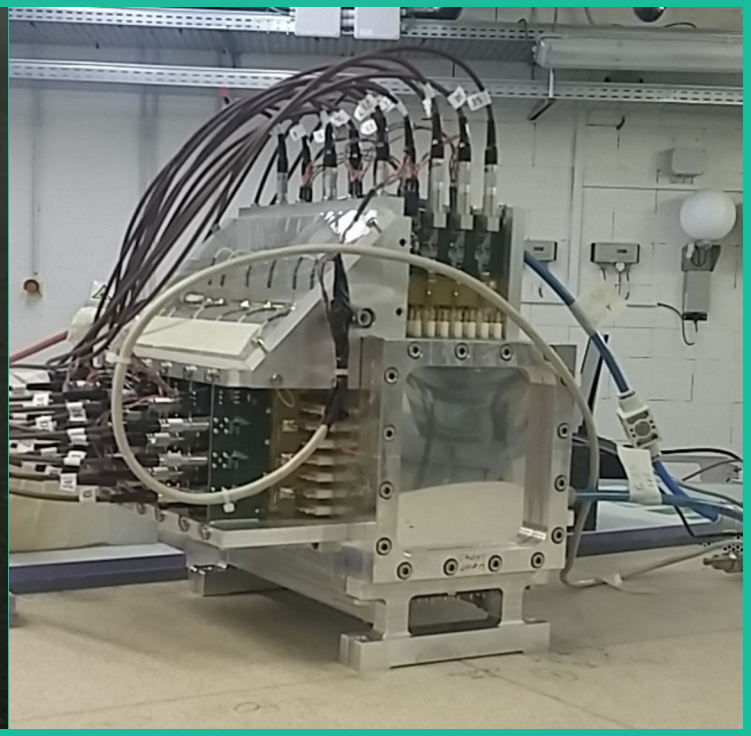


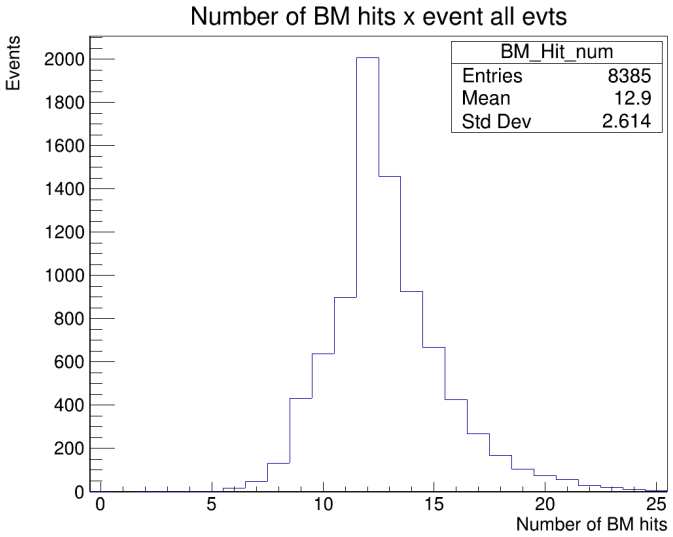


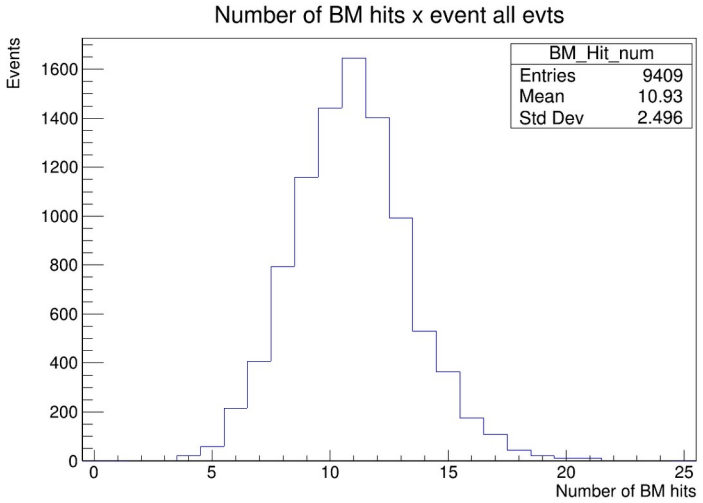
BM detectorS test @ CNAO

Yunsheng Dong

05/10/2022

HIT2022 BM performances

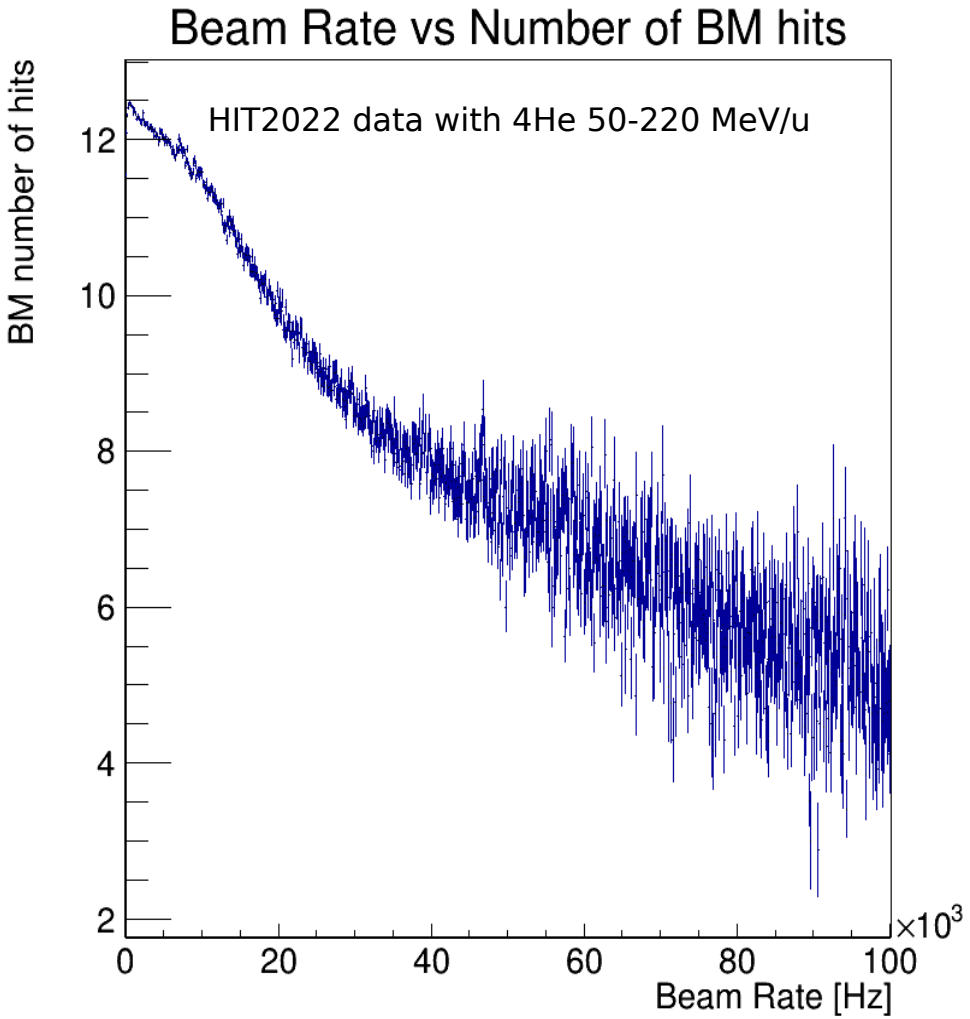




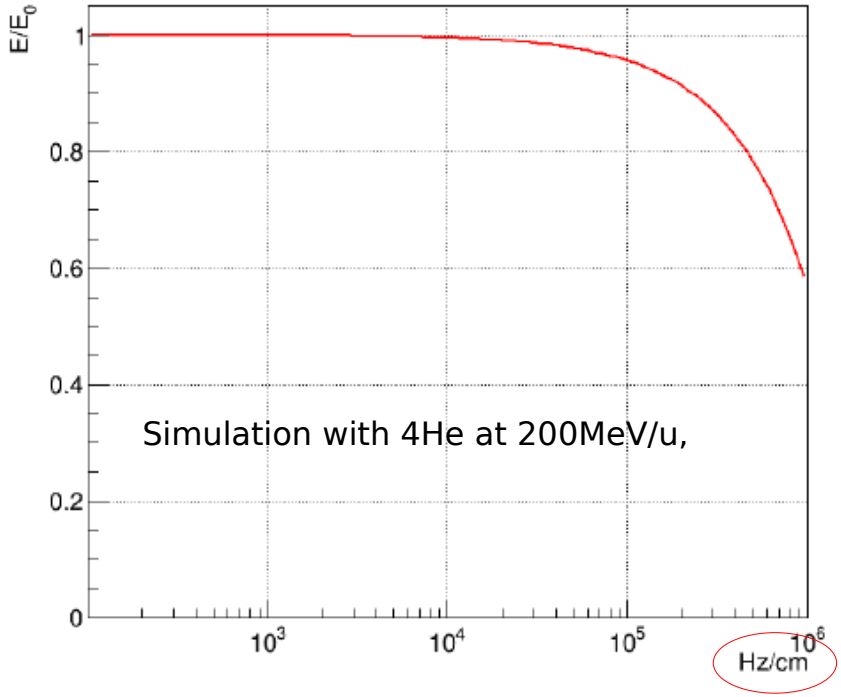
The BM performaces at HIT2022 depends a lot on the beam condition (e.g.: rate) and HV

- Run4717: He @ 220 MeV/u, 19/7:
  -HV at 2050 v, efficiency~0.88, N tracks~0.87
- Run4756: He @ 200 MeV/u, 20/7:
  -HV at 2000 v, efficiency~0.7, N tracks~0.68
- The HV has been set in order to have about 13 hit per event (e.g.:run4717).
- **In some cases, the current on the anode wire was too high (microamps) to increase the HV (Not detected even with 12C @ 700 MeV/u at GSI)**
- Beam profile compatible with the MSD preliminary results (e.g.: both measured the 220 MeV/u beam with a sigma of~2mm)

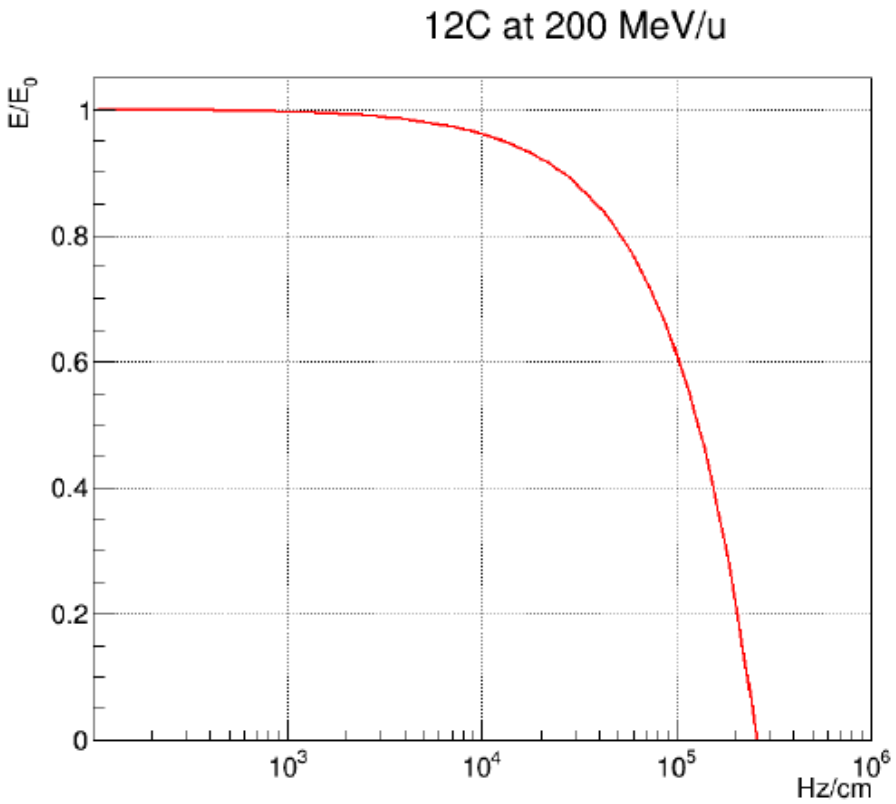
HIT2022 results with beam rate



- From HIT2022 data: the number of BM hits per event is related with the beam rate
- The BM start to suffer from few kHz (@ 10 kHz the mean number of hits is 11.5)
- This could be a serious problem with more ionizing particles



CNAO2022



Perform a BM performance assessment with respect to the beam rate.

- If available, we should be ready to go in the first shift of November
- Few hours should be enough for the whole data acquisition

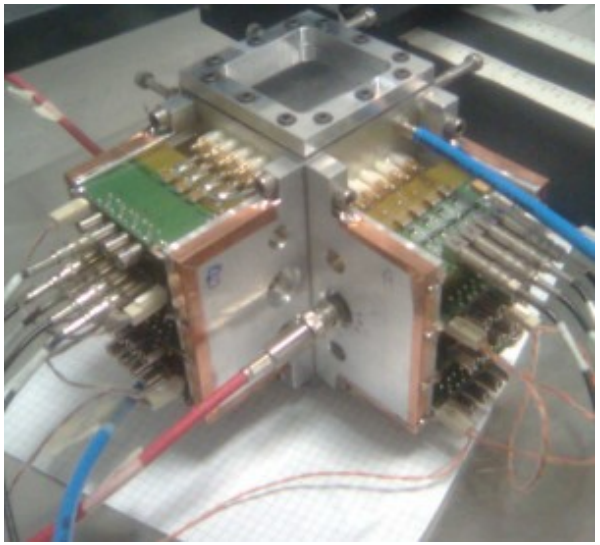
Primary goals:

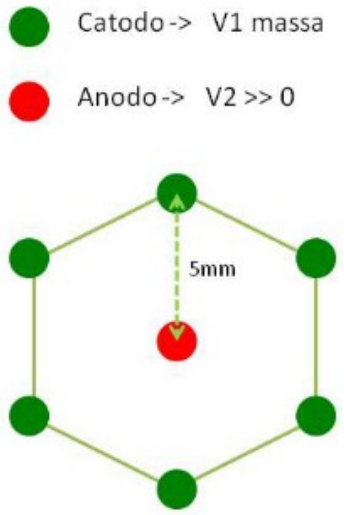
- Fixed 12C beam with rate ~100Hz – 1MHz acquired with FOOT DAQ

Secondary goals:

- Performance assessment of the miniDC (with a pixel or strip tracker, if available)
- Test with stand alone acquisition

miniDC





The miniDC is a drift chamber tested by F. Tommasino in his master thesis (2009/2010)

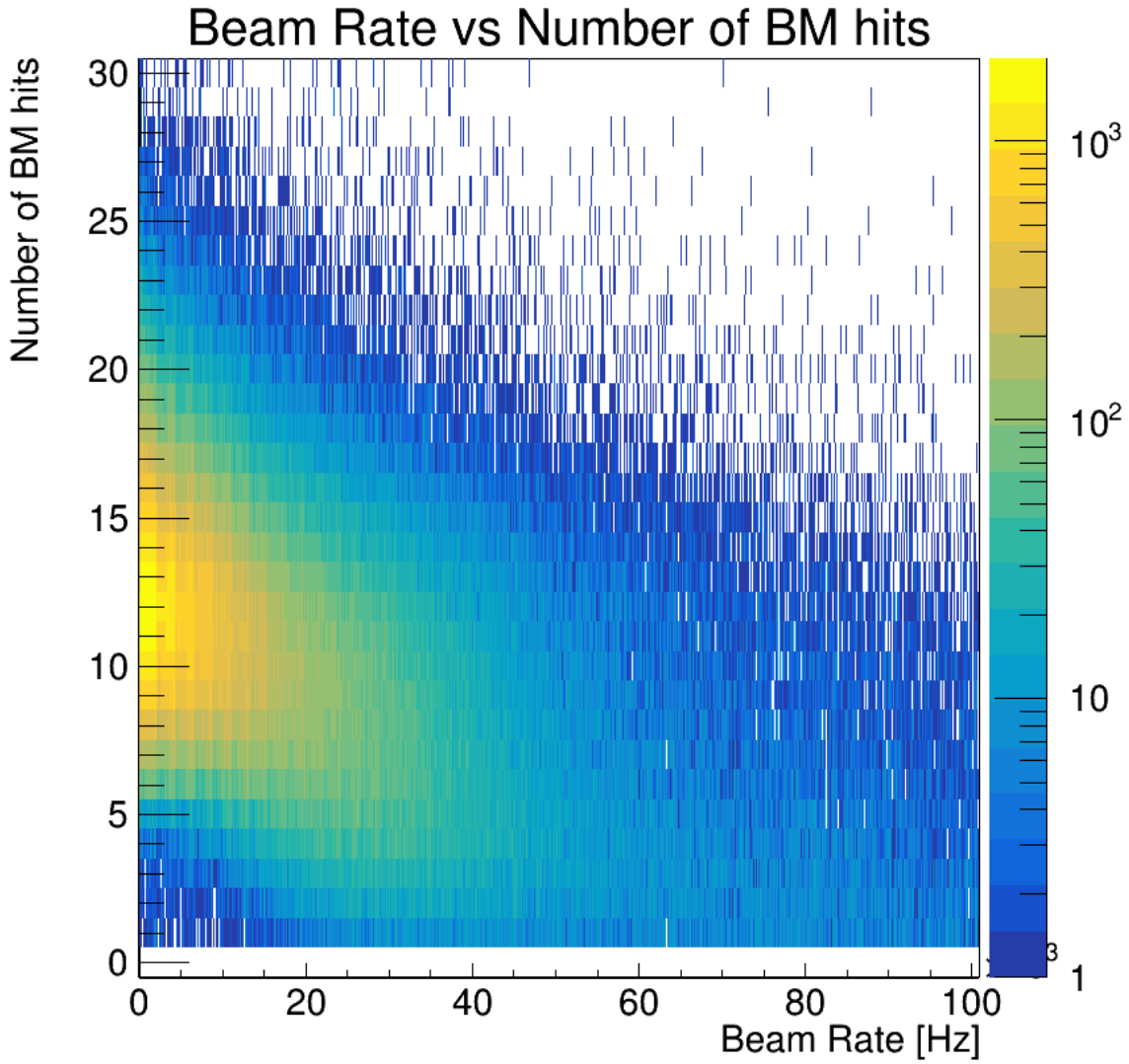
- Is a smaller DC with an active area of 4x4cm^2
- Each view with 4 planes and 4 cells per plane
- Hexagonal cell with a maximum distance of 5mm
- Two layer of mylar at beam entrance and exit
- Tested only with cosmic rays

With respect to the FOOT BM:

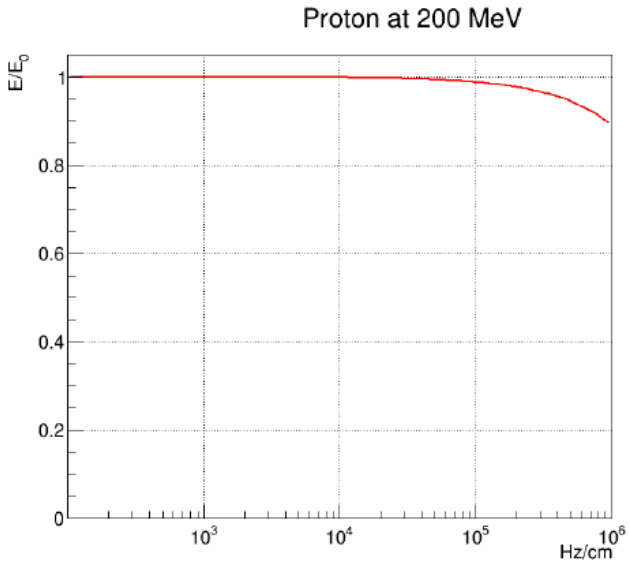
- Smaller active are, less number of planes and cells
- Smaller cell size, better E field conformation

Back Up

HIT2022 results with beam rate



Calculations for space-charge effect



In **first approximation** the BM cell can be considered as a drift tube with:
a=12.5 μm, b=0.5 cm and V=1800 V
The Ar/CO2 80/20% gas parameters can be taken from Garfield++:
Gain=$1.954*10^4$
Ion mobility=1.824 $cm^2/(V*s)$
Particles=97.6 pairs/cm (calculated)

N.B.: The beam rate in the plots is evaluated as Hz/cm