

BM update for CNAO2023

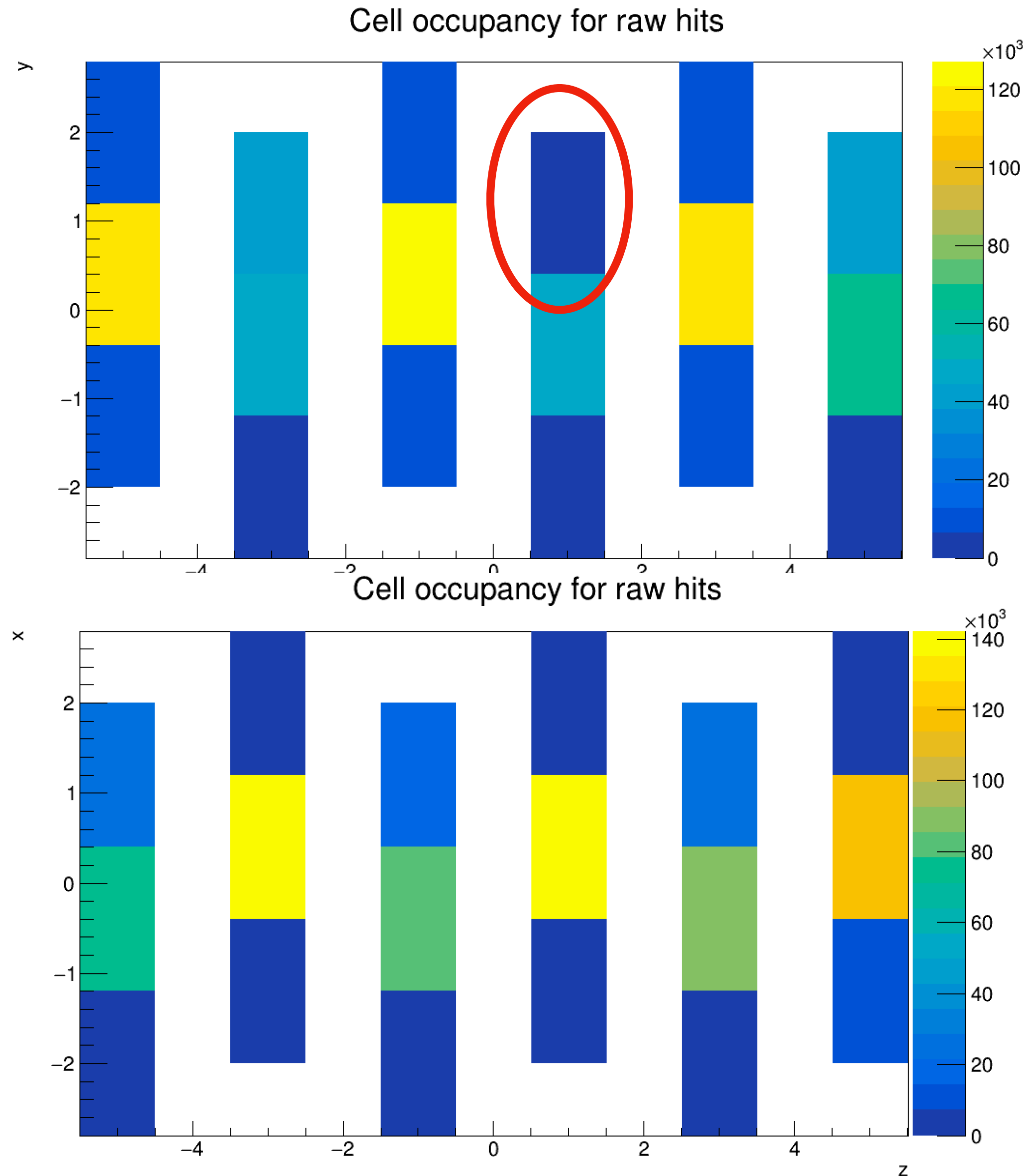
Yunsheng Dong
15/11/2023

During data taking

On the first day:

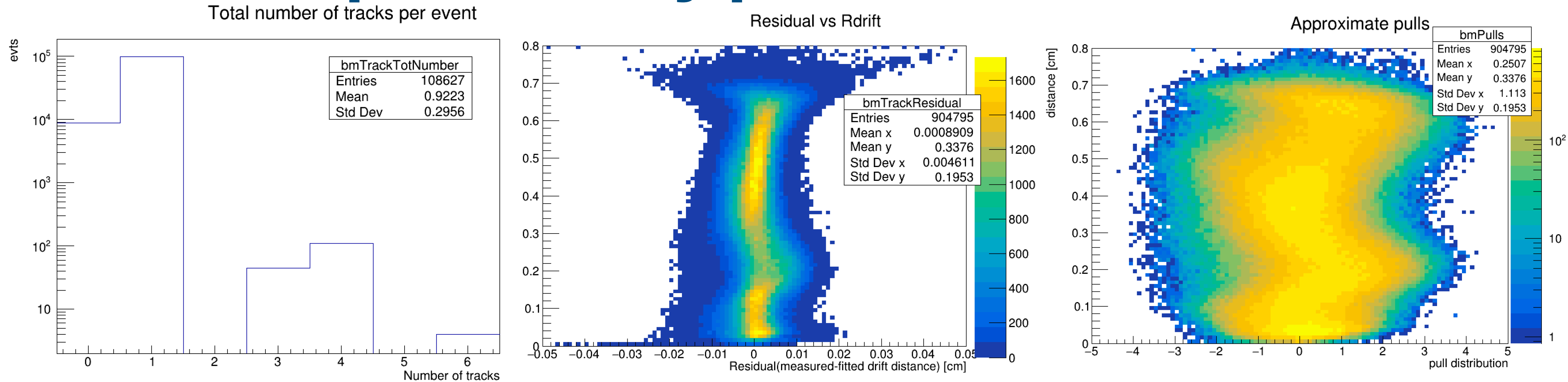
- We had got few issues to set a proper working point for the BM, probably due to a gas leakage.
- We started with a high HV value (~ 1800 V) to compensate the leakage. Then we decreased step by step the HV checking the TDCsize plot in order to collect about 13 BM hits per event.
- After a couple of hours, the BM was stable. The optimal HV for 12C @ 200 MeV/u was 1685-1700
- From the second day, we started to flux the BM with a high gas flow half an hour before the beam availability, then we reduce the flux during the beam time. In this way the detector worked properly since the beginning

(Almost) dead channel



- One of the BM cell didn't work properly. The signals were too low and not properly shaped.
- Need to check the channel in the Lab (the detector is at CNAO at the moment)
- Due to the redundancy, apparently this channel do not seems to have a relevant impact on the BM performances (check the next slides)

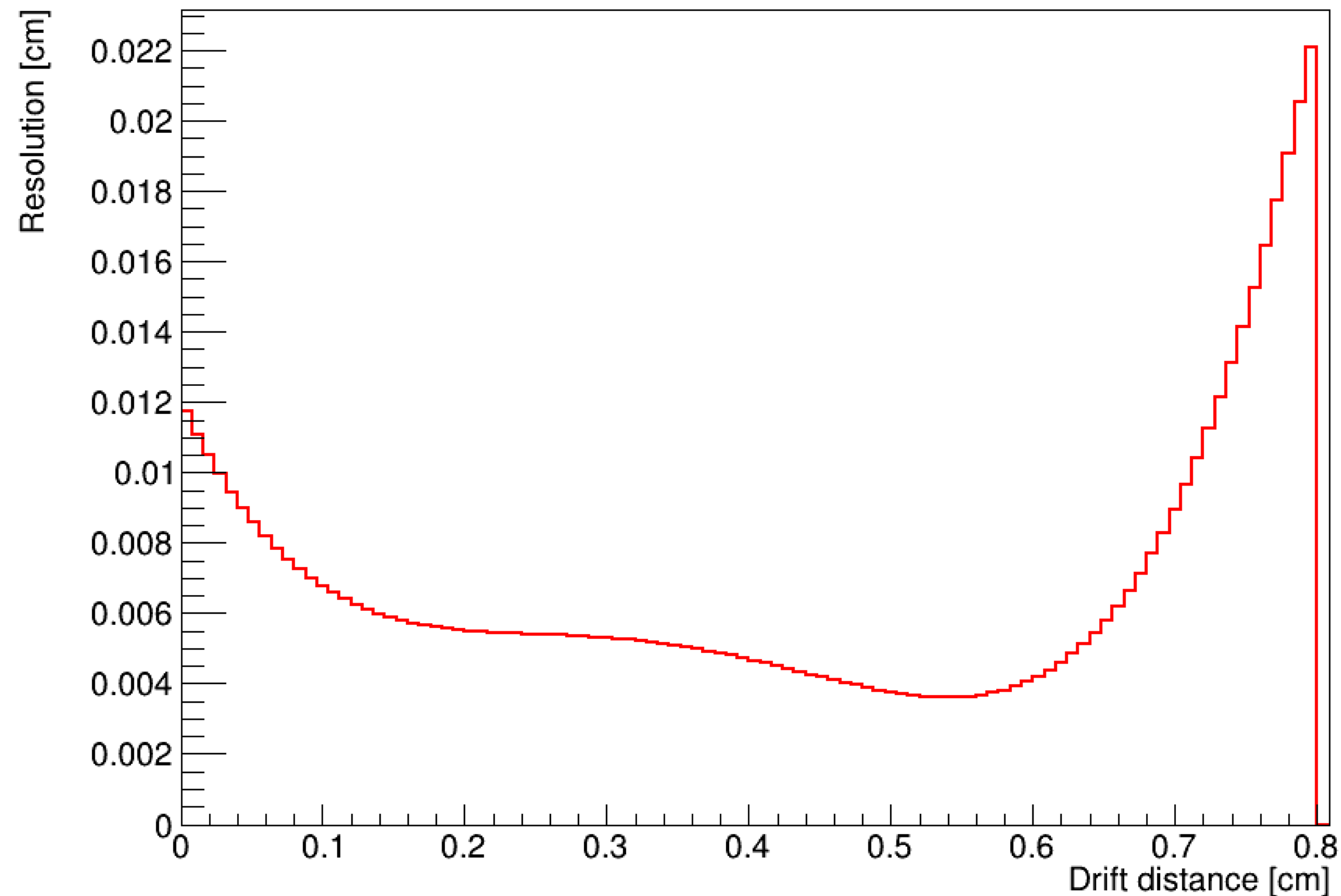
Detector preliminary performance results



- Run 6102: alignment run collected on 29/10, with 12C @ 200 MeV/u, no target, no magnetic field
- Preliminary optimization of the ST relation and preliminary study of the BM track reconstruction parameters already conducted.
- ~92% of events with 1 BM reco track (as the usual BM track reco efficiency)
- ST relation can still be improved, but the residual distribution is very narrow

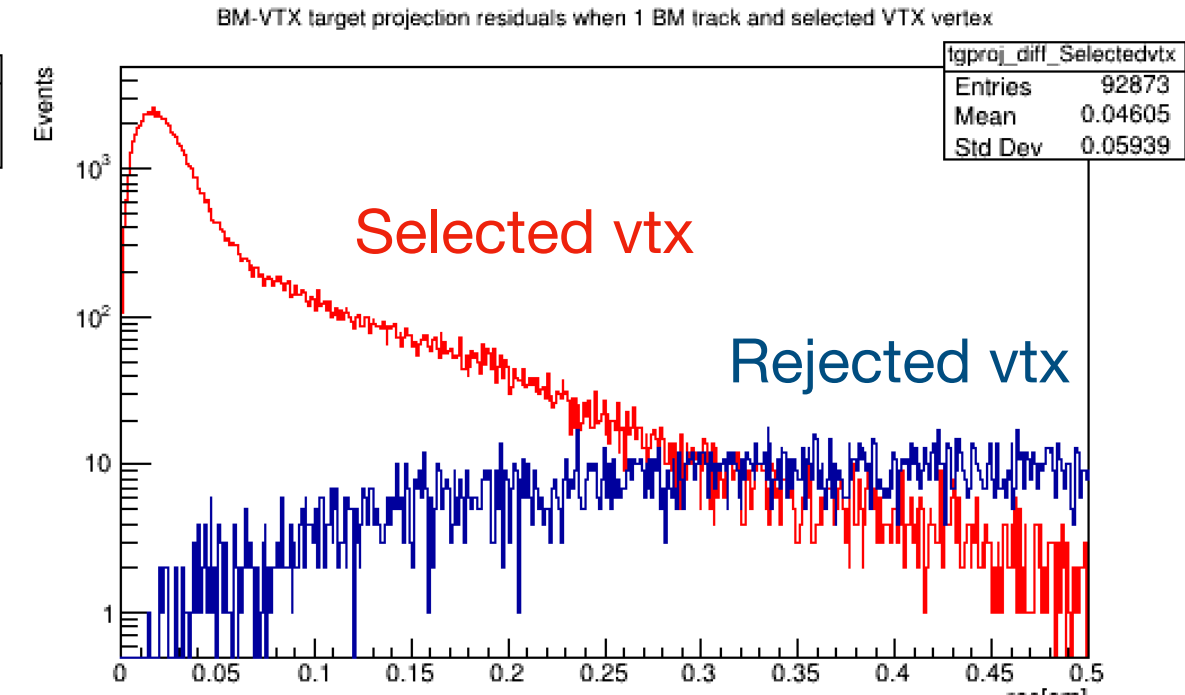
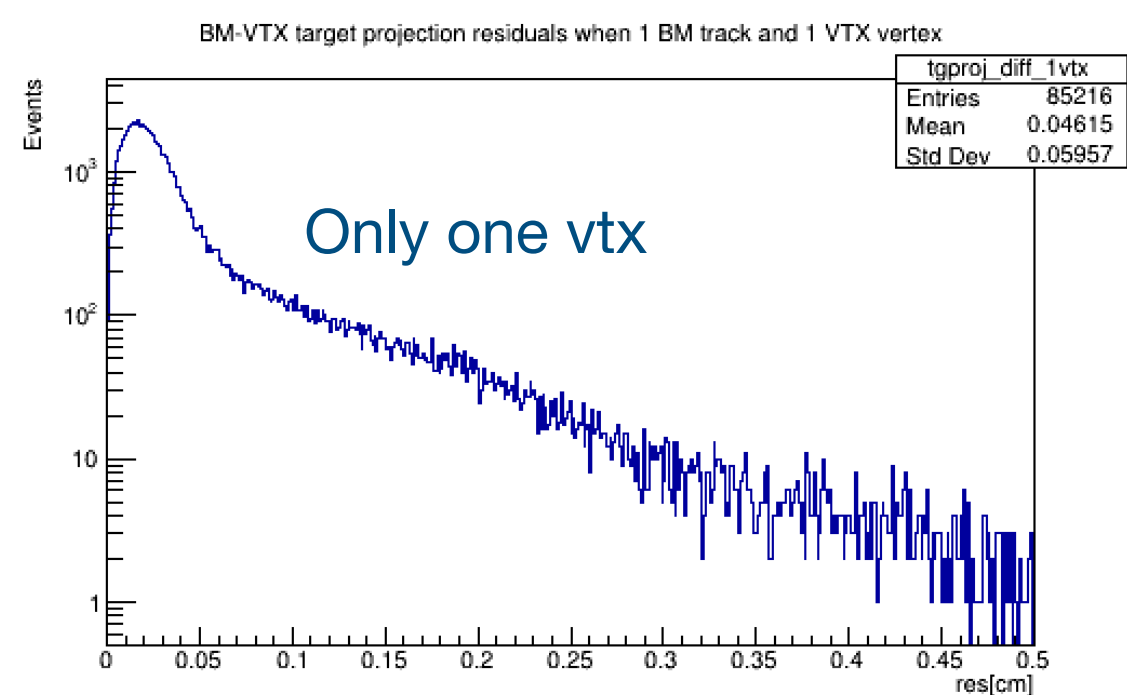
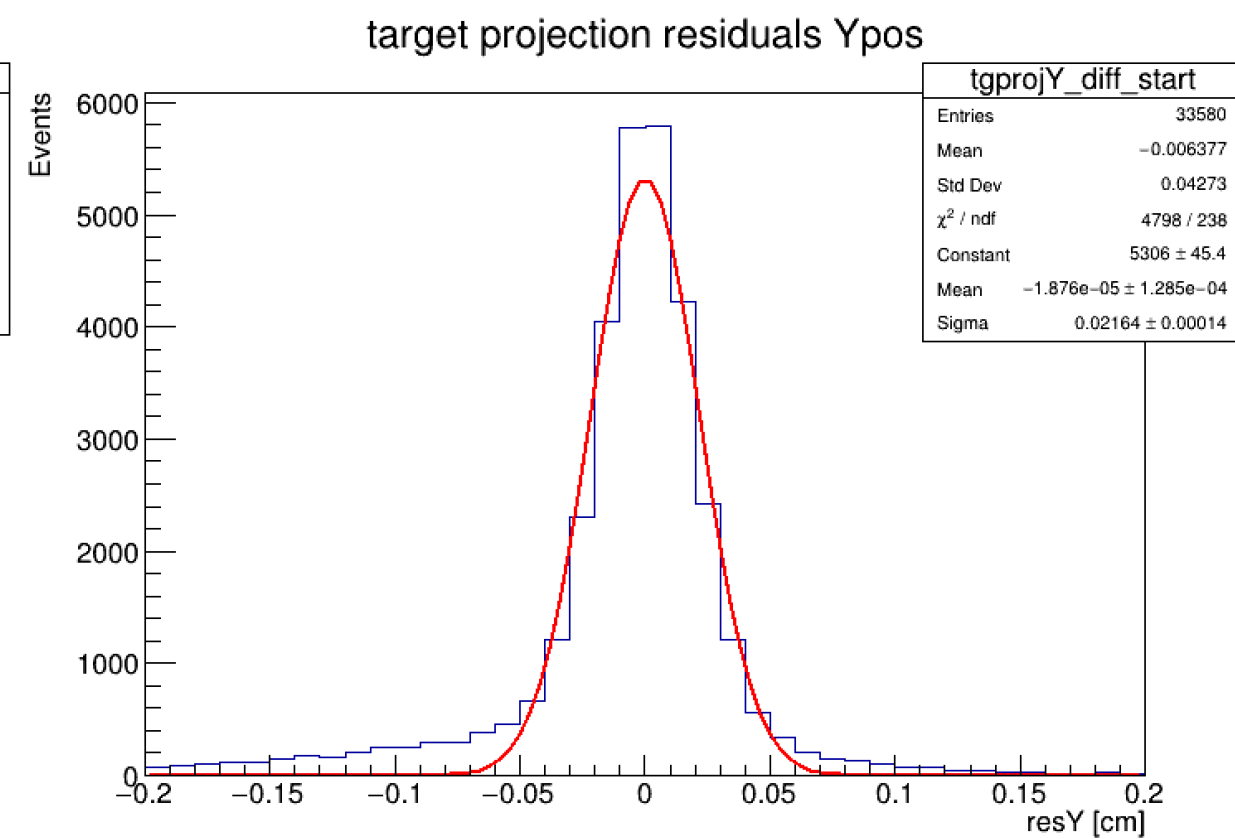
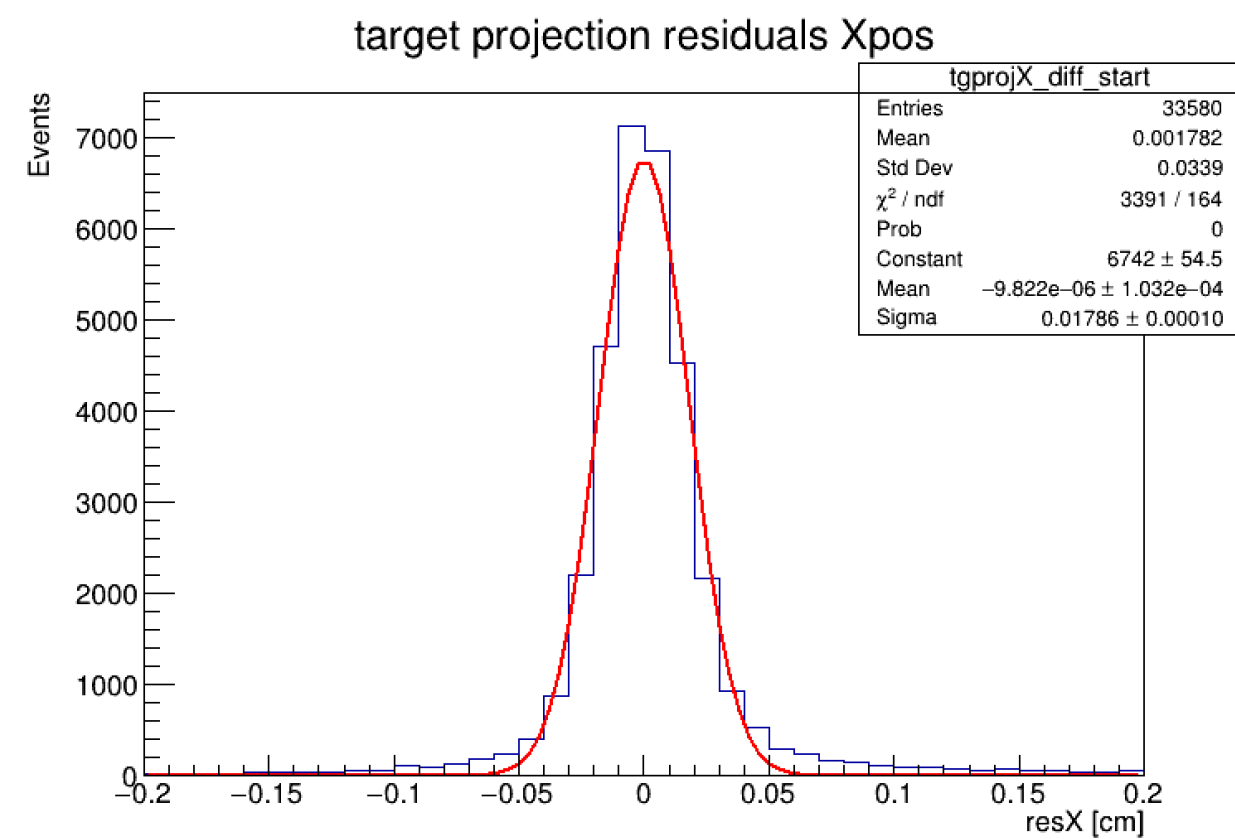
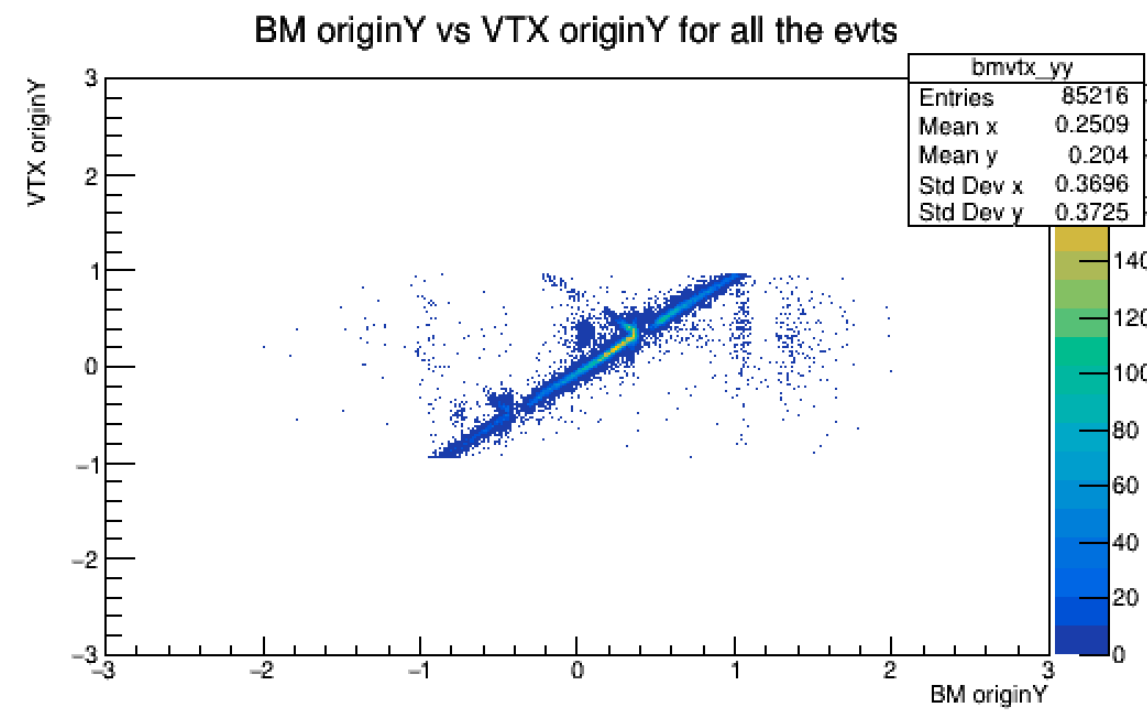
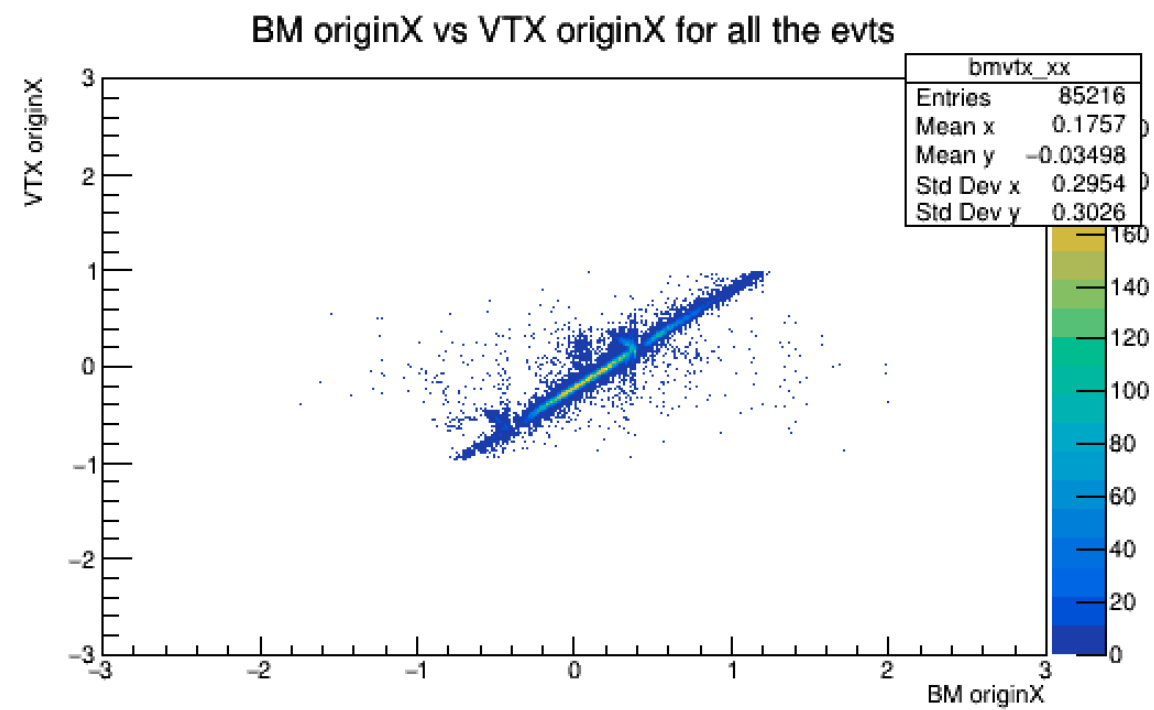
Detector preliminary performance results

BM input resolution



- The detector resolution has been computed with the usual method fitting the residual distribution
- Apparently the space resolution is very good
- Probably this is due to the track reconstruction optimization
- Checks and studies are ongoing

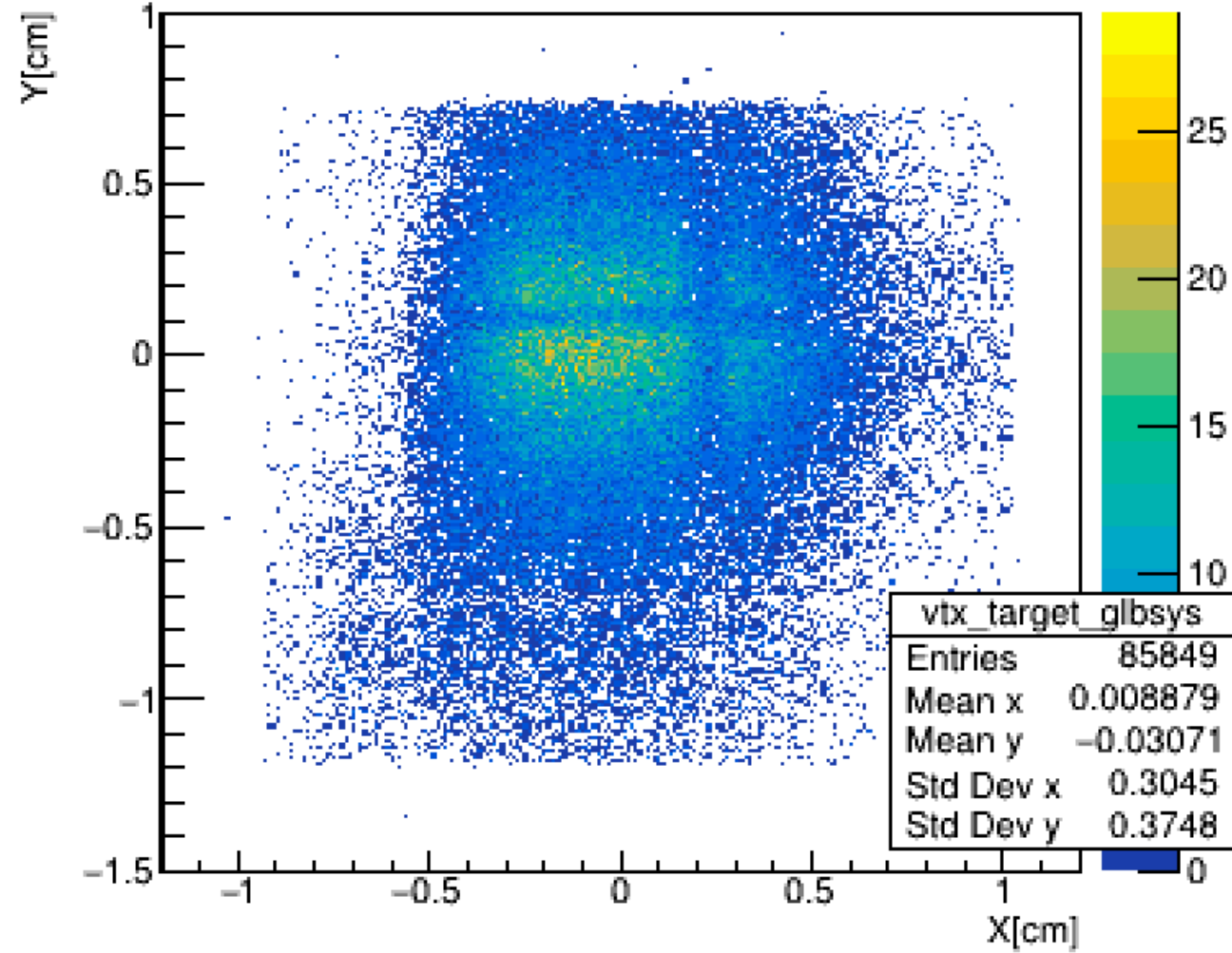
BM - VTX



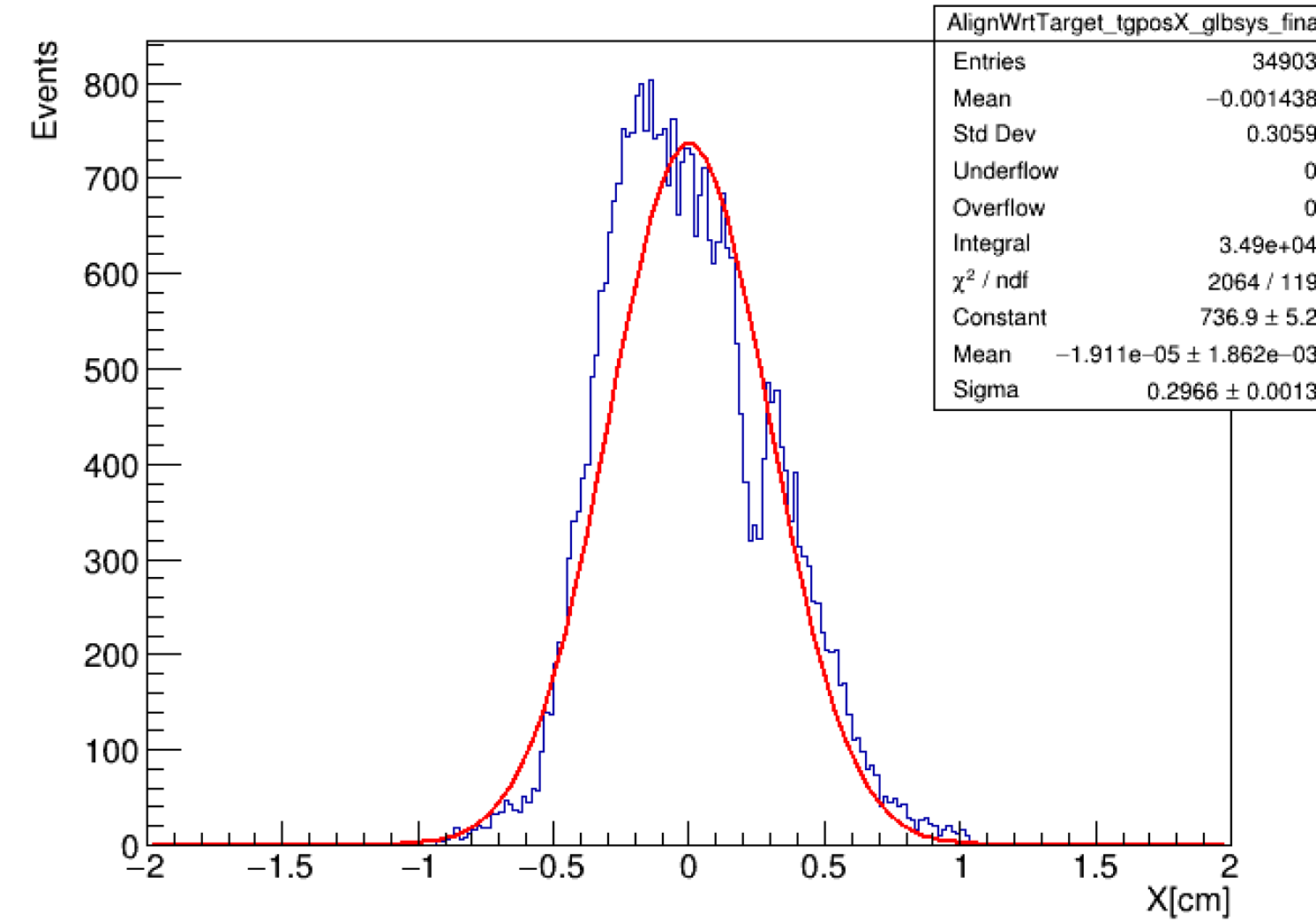
- Run 6102: BM-VTX correlation maintained till the end, but this is not valid for all the runs
- Residuals between BM and VTX with a sigma of ~180-220 μm
- With the new STrel and track reco parameters, the capability of the BM to resolve the VTX pile up is increased
- Need to study “high” beam rate runs, maybe also with new methods

Beam Profile(s)

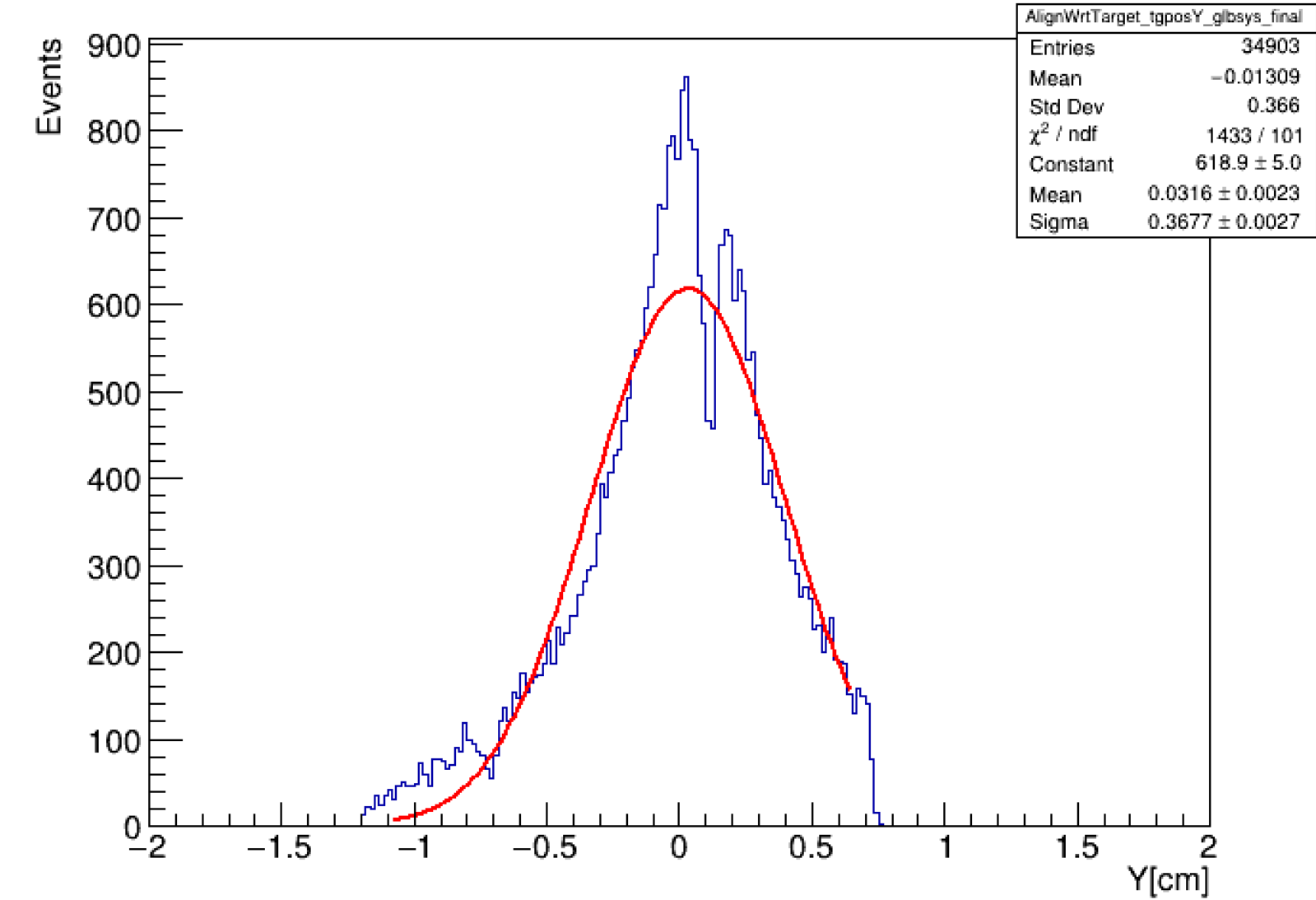
vtx tracks on target projections in GLB sys



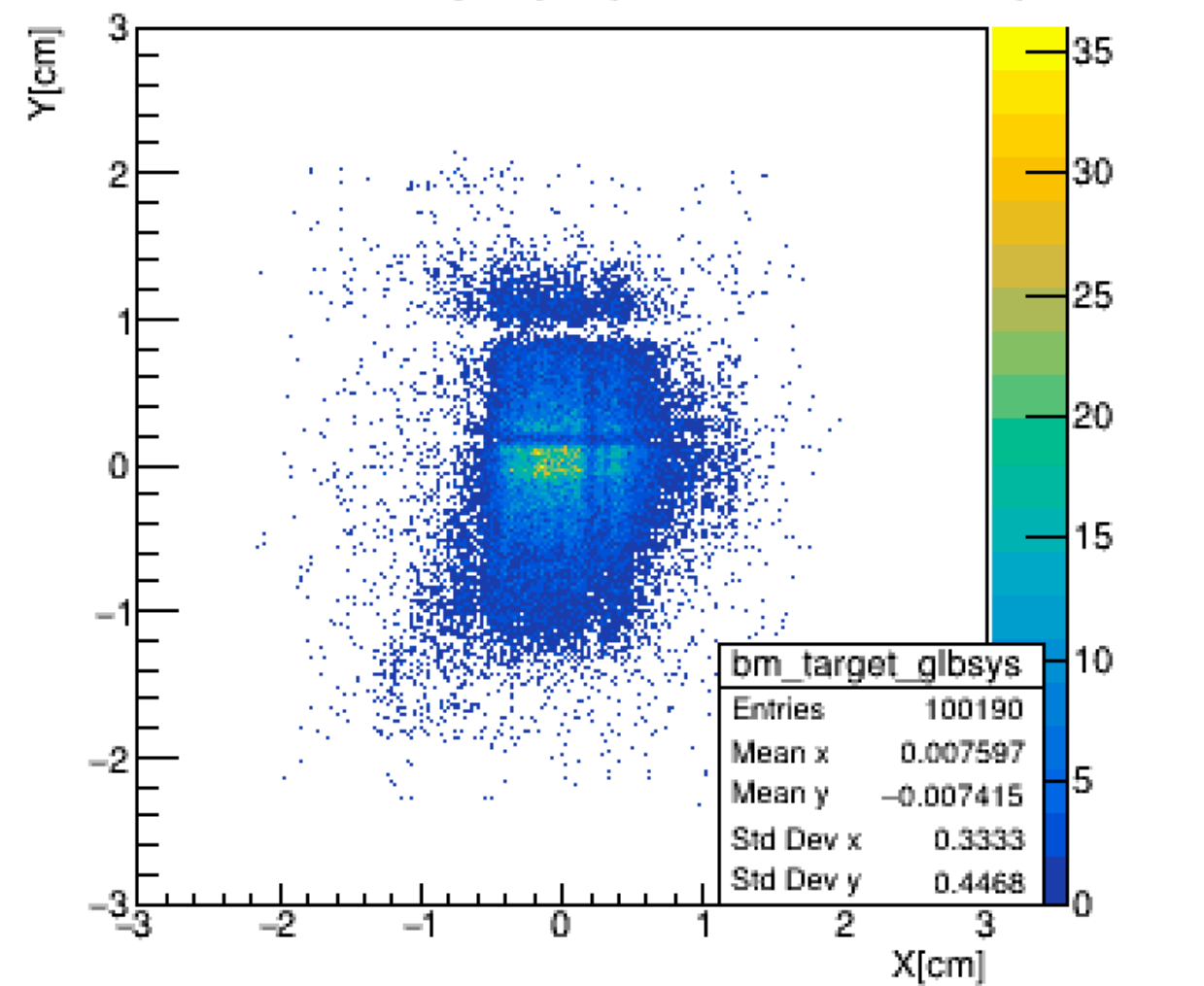
VT projection on target Xpos in glb sys



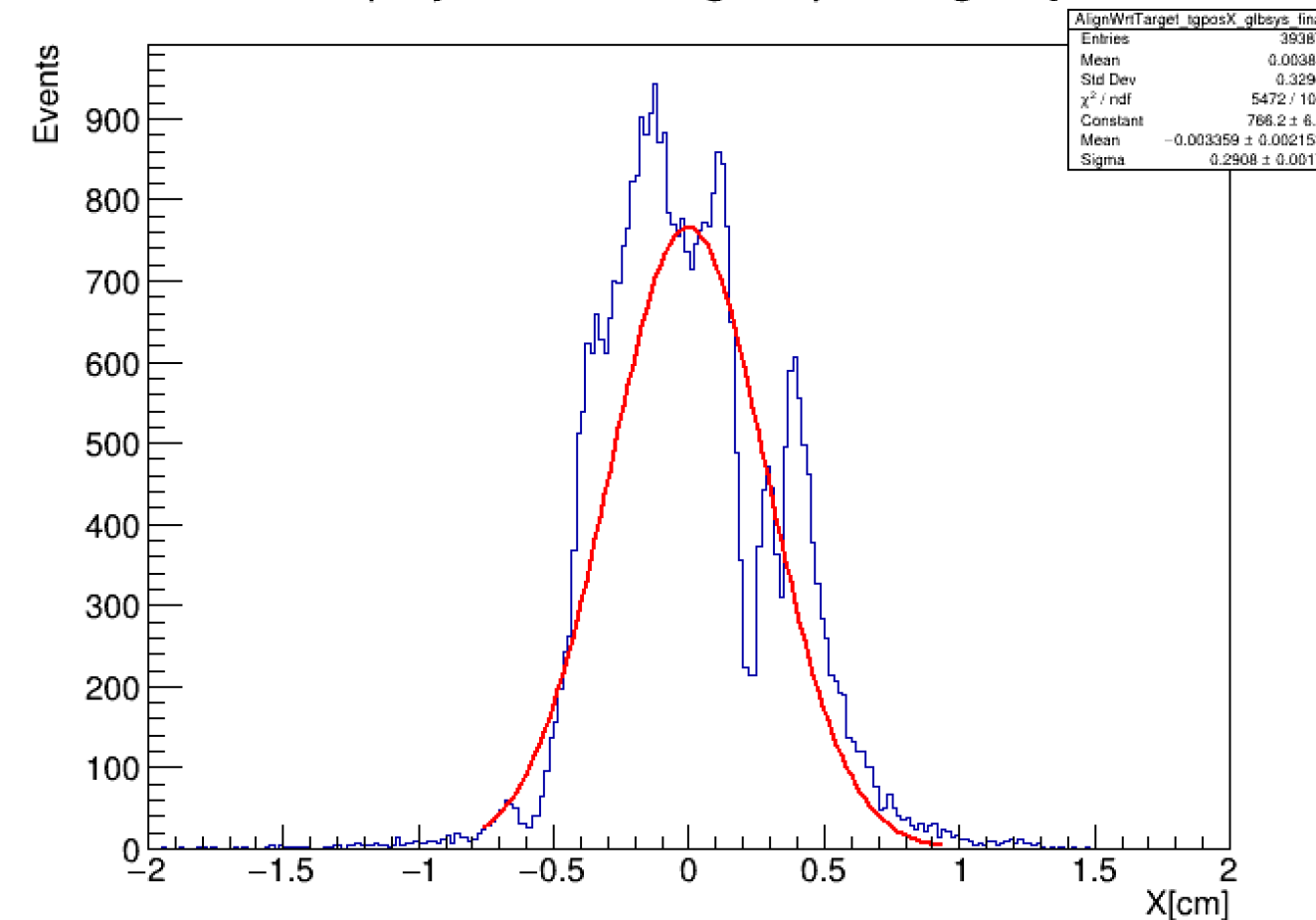
VT projection on target Ypos in glb sys



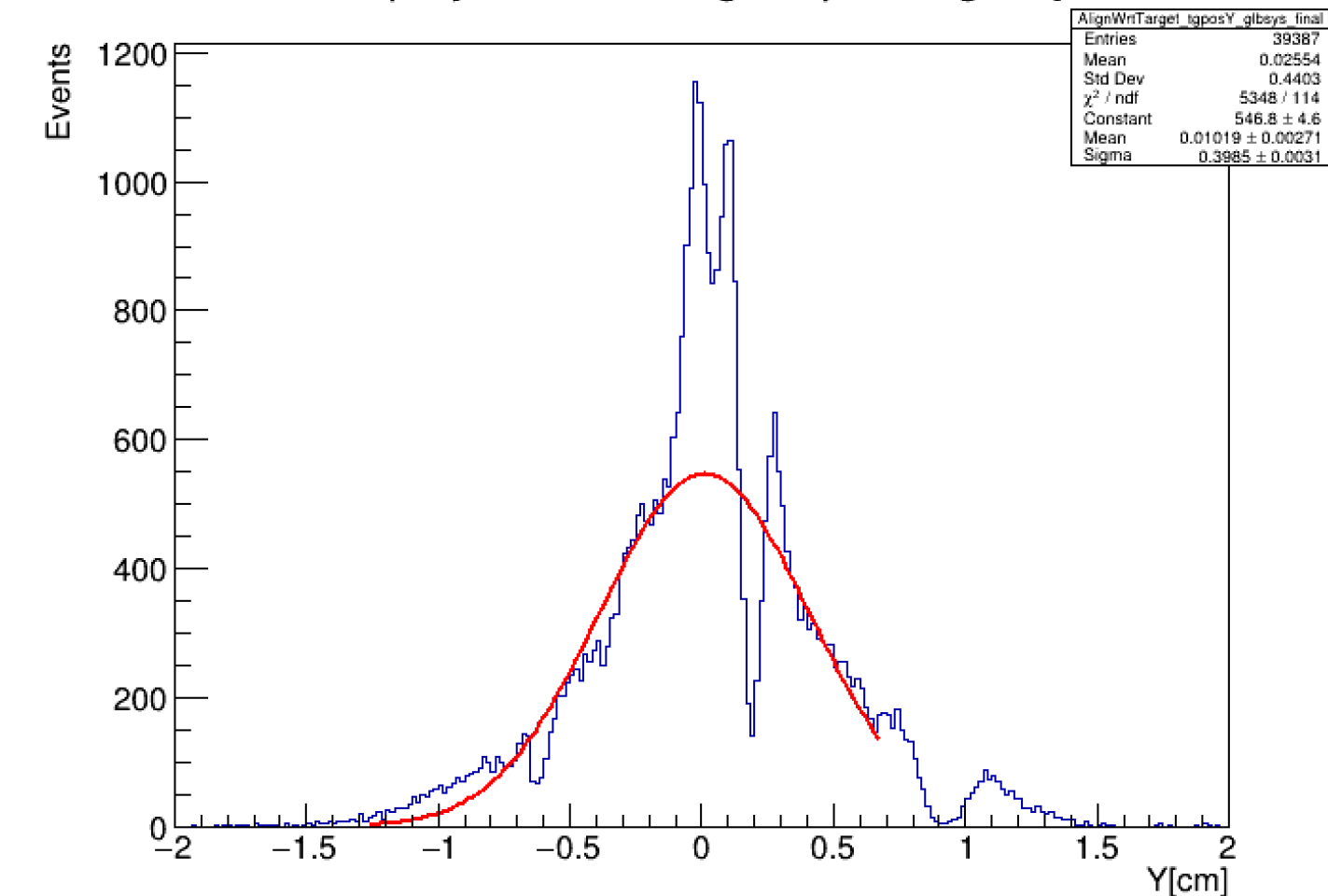
BM tracks on target projections in GLB sys



BM projection on target Xpos in glb sys



BM projection on target Ypos in glb sys



Other remarks

- In the fragmentation runs there are both fragmentation and majority events. The BM T0 values are different for majority and fragmentation events. The code in shoe will be updated soon to take into account this effect.
- Checks and optimization of the BM parameters and performances will be completed, then the work will be done again for the GSI2021, HIT2022 and CNAO2022 campaigns. Are there preferences or priorities?
- Alignment has been conducted for VTX, BM and TW (Work in progress for the IT and the MSD). Since the beam is asymmetric and not stable, at the moment the beam has been centred in the VTX (as much as possible) and the other detectors have been aligned with respect to the VTX. Is this strategy ok? Any other idea/preference?
- No idea about the alignment of the dipole (maybe some ideas with the global tracks? Do we really need to align the dipole? Can we consider the dipole as “fixed” with the IT?)
- Up to now different people modified the campaign files to take into account the different geometries etc. Probably not all the geometry/configuration etc. files have been checked, do we have an excel files? Is there someone that can update the campaign and the excel files?