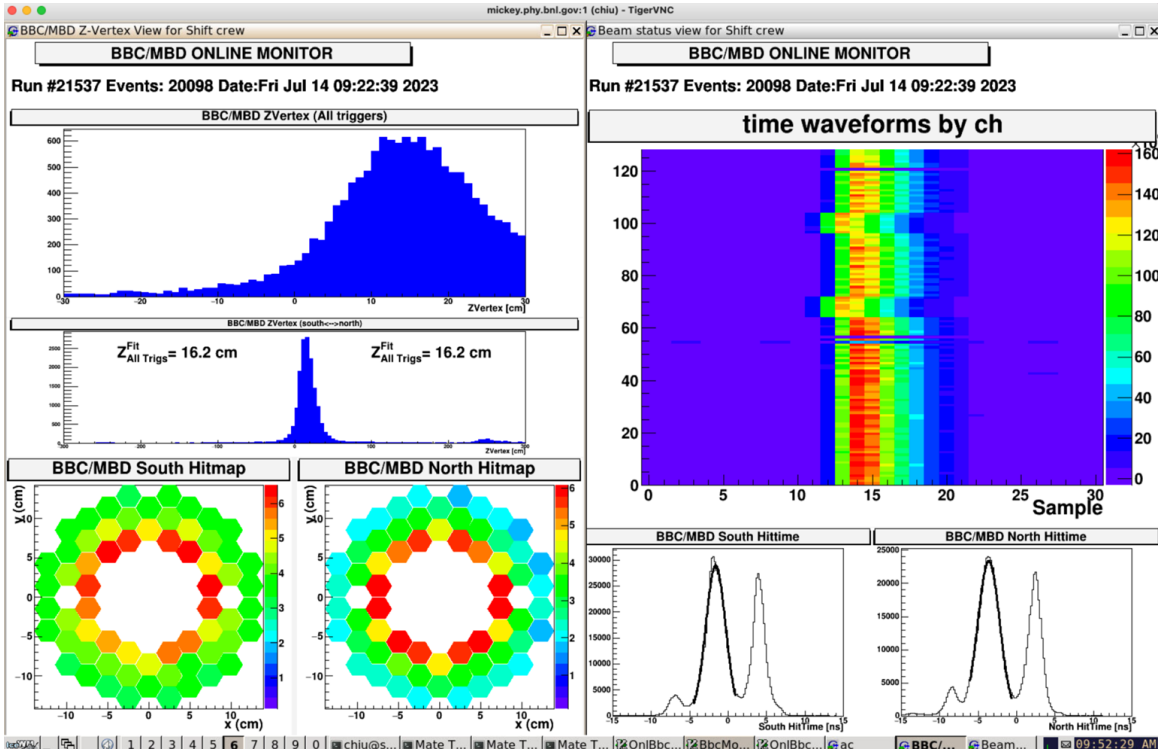
sPHENIX Commissioning Progress

- The TPC has been incorporated into the big-partition of the DAQ system so that the TPC can take data together with other sub-detectors.
- The TPC group is exploring different ways (such as a spark protection system and increased drift field) to enable the operation of its GEMs at the desired voltages.
- The MVTX is in the process of being incorporated into the big-partition as well. Mitigations for the unexpected issue from beam backgrounds on the MVTX readout continue to be explored, both on the machine and detector end.
- All sPHENIX sub-detectors are gradually improving their DAQ stability and efficiency and providing more extensive online monitoring and event display for the shifters.
- We are also constantly fighting with the high temperature and high humidity with our chillers and air-conditioning handlers, inside and outside the IR.

One example of online-monitoring from the MBD:

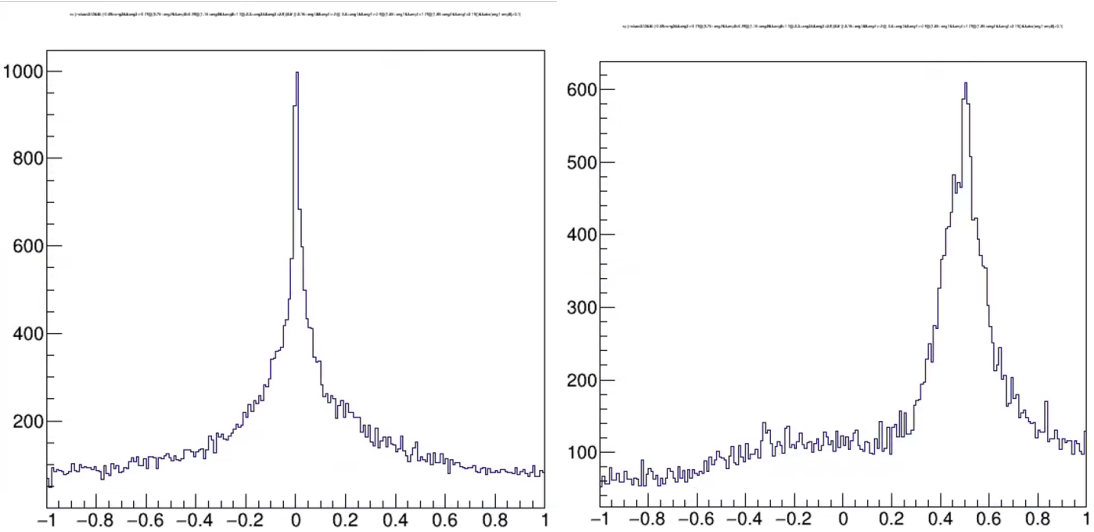
- This is an example of the online-monitoring plot from MBD.
- It shows little background at the +/- 2.5 m from IP (where MBD's are). But MVTX still suffers from those "protocol-errors" due to beam such that chips have to be reset before they can be read out again. Unfortunately, this is not a plot that Angelika Drees can use to reduce the MVTX background.

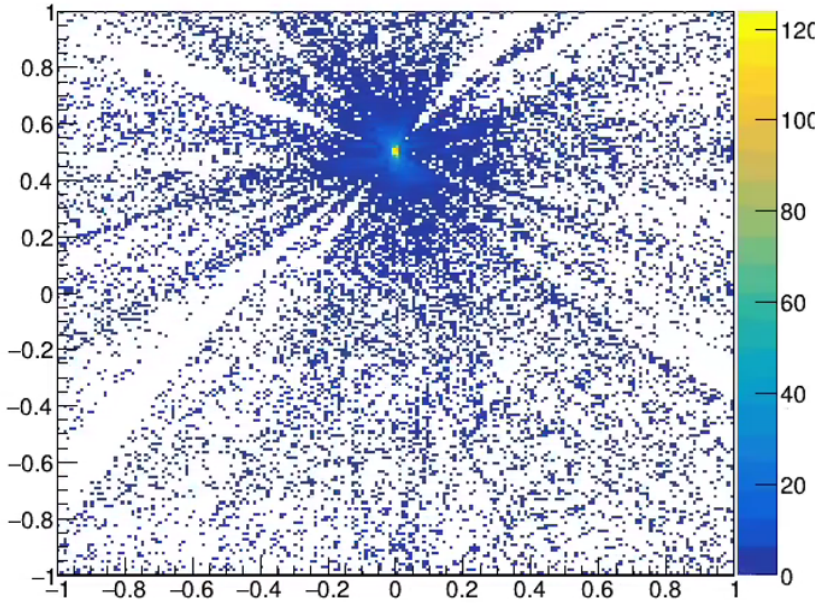


MBD

The beginning of vertexing (INTT) :

- The first attempt of looking for vertices by INTT in zero magnetic field.





Survey data was not incorporated yet.

12 week sPHENIX Commissioning Plan

- 2 weeks of stores with 6-28 bunches @ zero crossing angle (<2 kHz) for initial tune-up of timing and trigger.
  - The magnet doors will be closed and the magnet ramped at the earliest at one end of this period.

- 2 weeks of stores with 111 bunches @ zero crossing angle (1-5 kHz) for optimizing trigger, plus data analysis & diagnosis.
  - The trigger developed in the first two weeks will provide physics triggers for all other detectors

- 1 week of machine studies of optimizing crossing angle.
  - The major goal of this period will be to demonstrate the narrower vertex distribution and reduced rates in the TPC allowed by the crossing angle. The evidence for this will come from the vertex distribution from the trigger and hit distribution in the TPC and the silicon detectors.

- 1 week of 111 bunches @ non-zero crossing angle for calorimeter timing/tune-up.
  - As the luminosity nears the design, the experiment will continue to collect data from as many of the sub-detectors as possible, and the radiation damage to the silicon photomultipliers will be carefully monitored.

61 days after May 18, 2023.

- 4 weeks of 111 bunches @ non-zero crossing angle (1-5 kHz) for operating tracking detectors including TPC.
  - This running period is designed to collect data from all detectors which will asymptotically approach physics data at modest rate. Any detectors which are having problems taking data or keeping up with the rate will be debugged during this period.

- 2 week of 111 bunches @ non-zero crossing angle with increasing collision rates (15-20 kHz).
  - This period is a dry-run of operation for physics which will develop software and procedure for physics data taking, which immediately follows this period.