

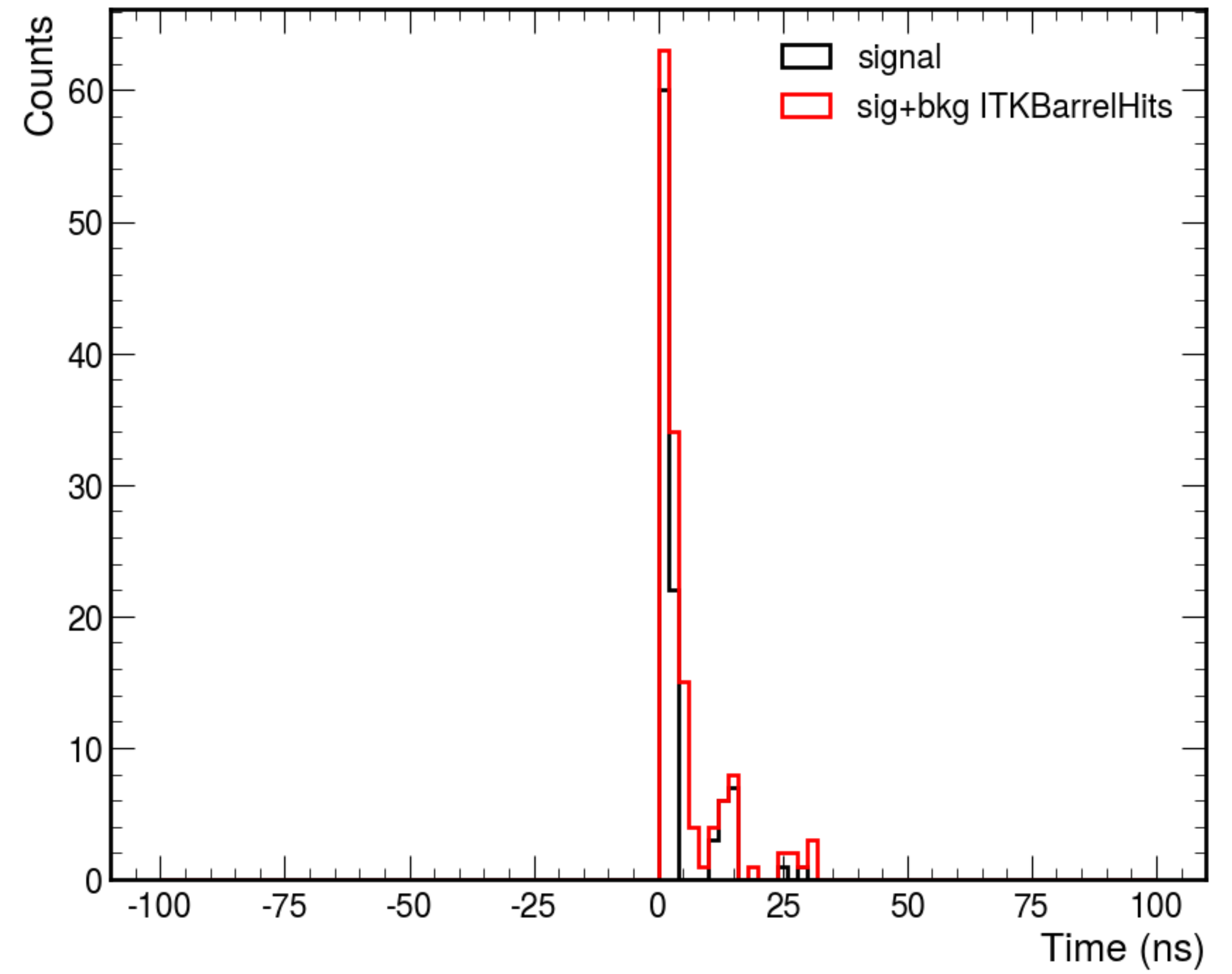
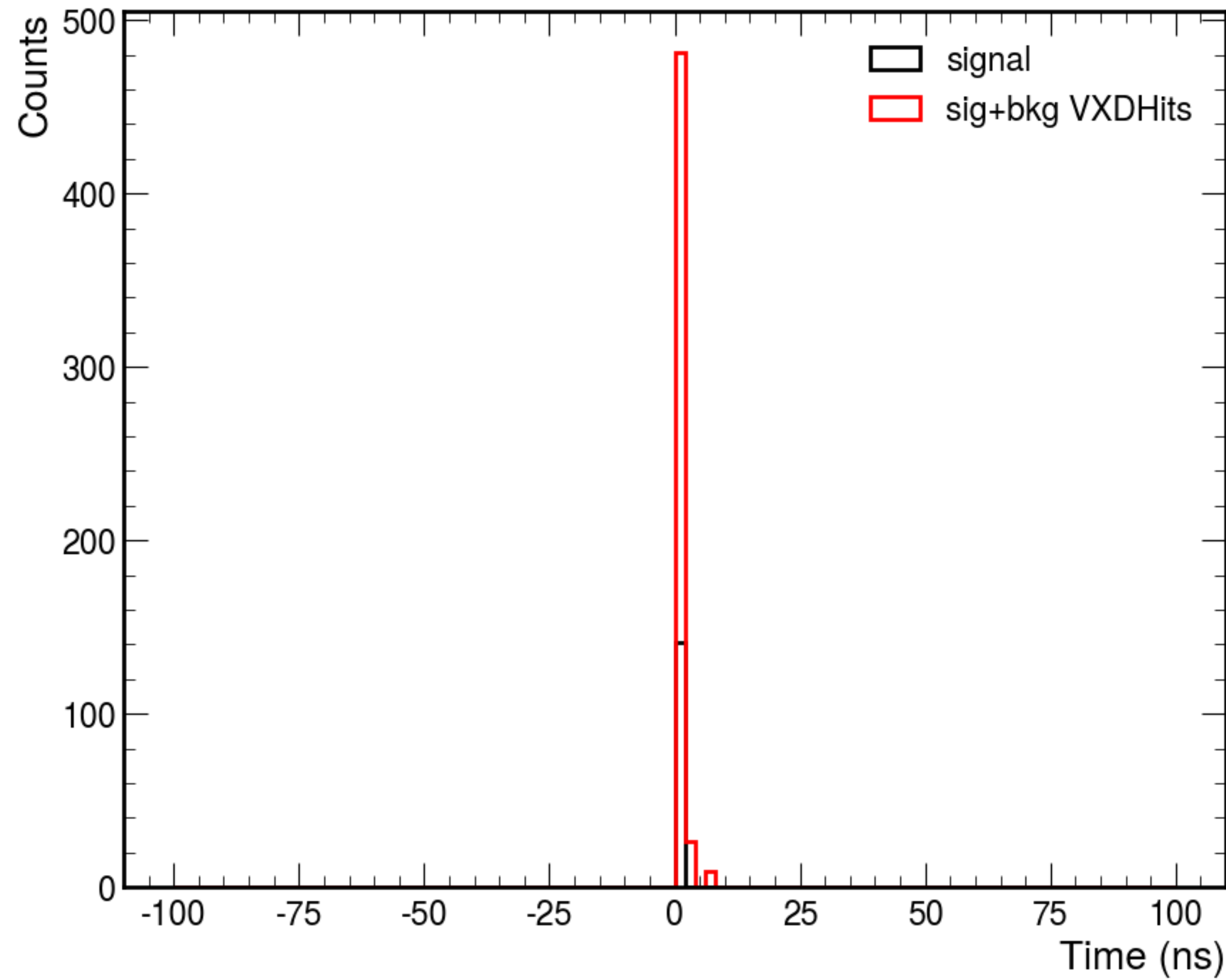
Status update

Chenguang Zhang / 25Apr2025

Overview

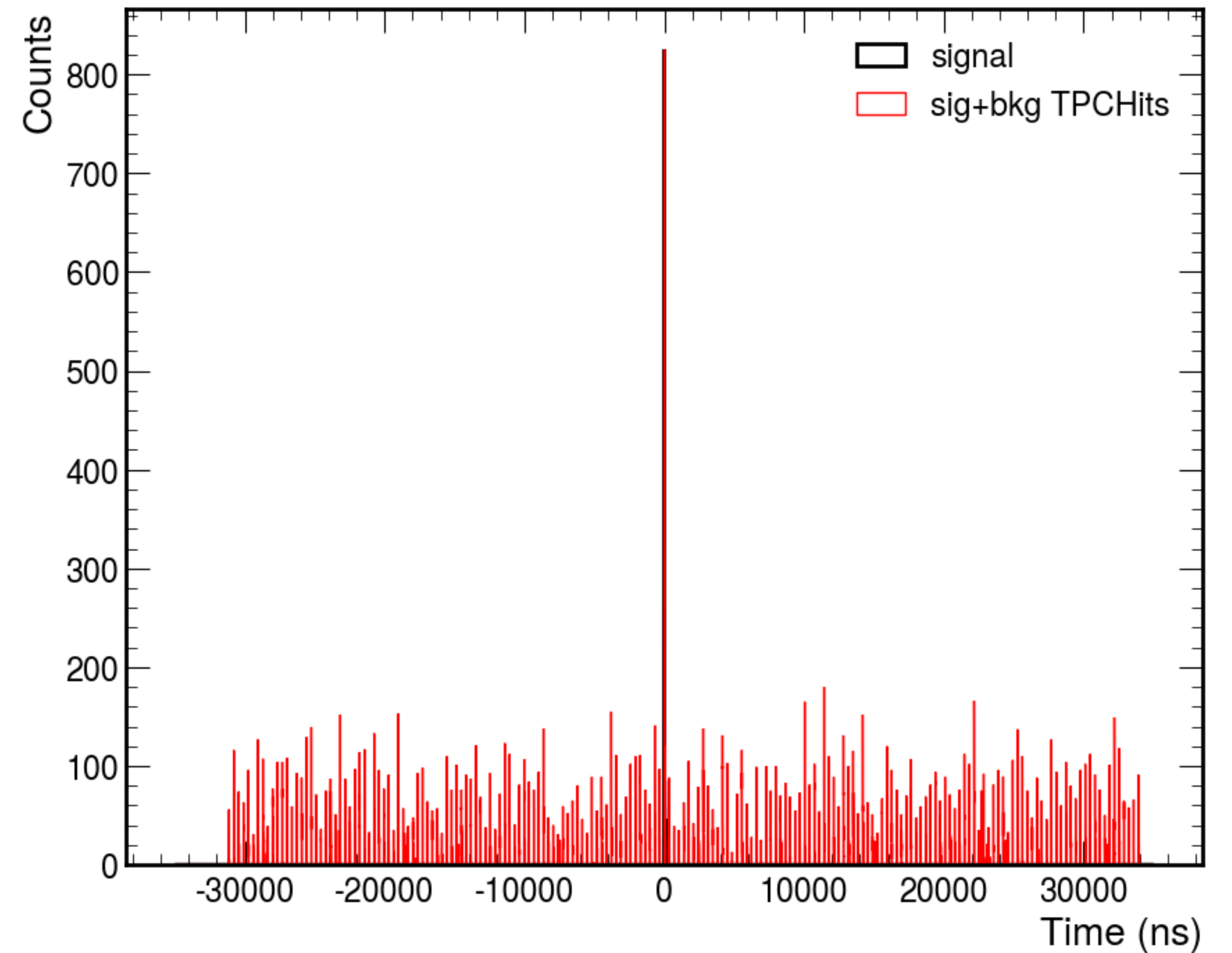
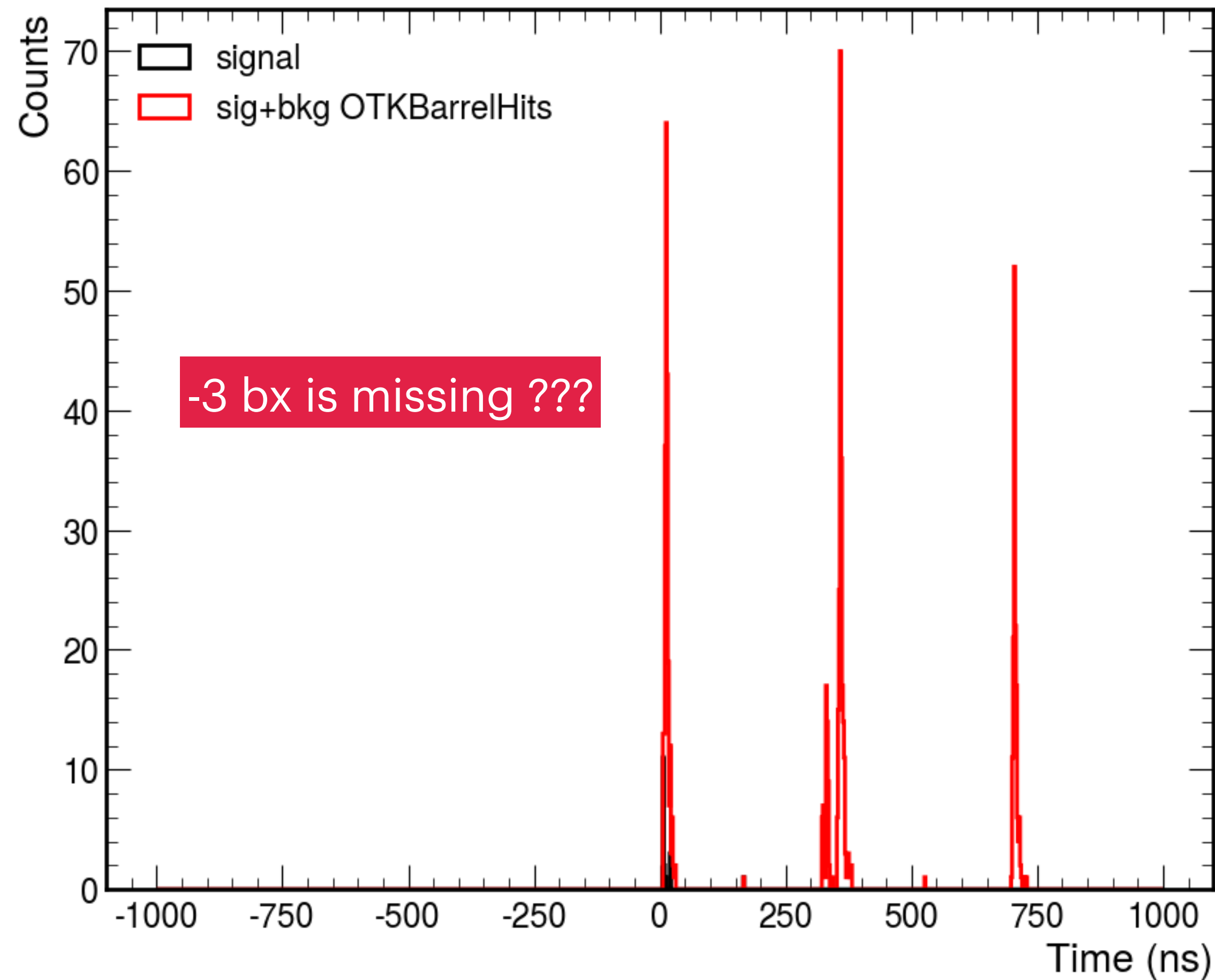
- **MR247 supports bkg-mixing with fixed time-window mode**
 - **Bunch-spacing: 340 ns**
 - **VXD, ITK: 200 ns**
 - **OTK: 1000 ns**
 - **TPC: 34 us**
- **Bkg-simulations from Haoyu Shi, one file includes 10 BX**
- **For one signal, the event-time-window is [-34 us, 34 us], with the signal centered at zero**
 - **100 BX before and after a signal corresponds to +/- 10 bkg-simulations**
 - **Silicon hits are not included in the event-time-window if their timestamps exceed the detector-time-window**

Sanity plots



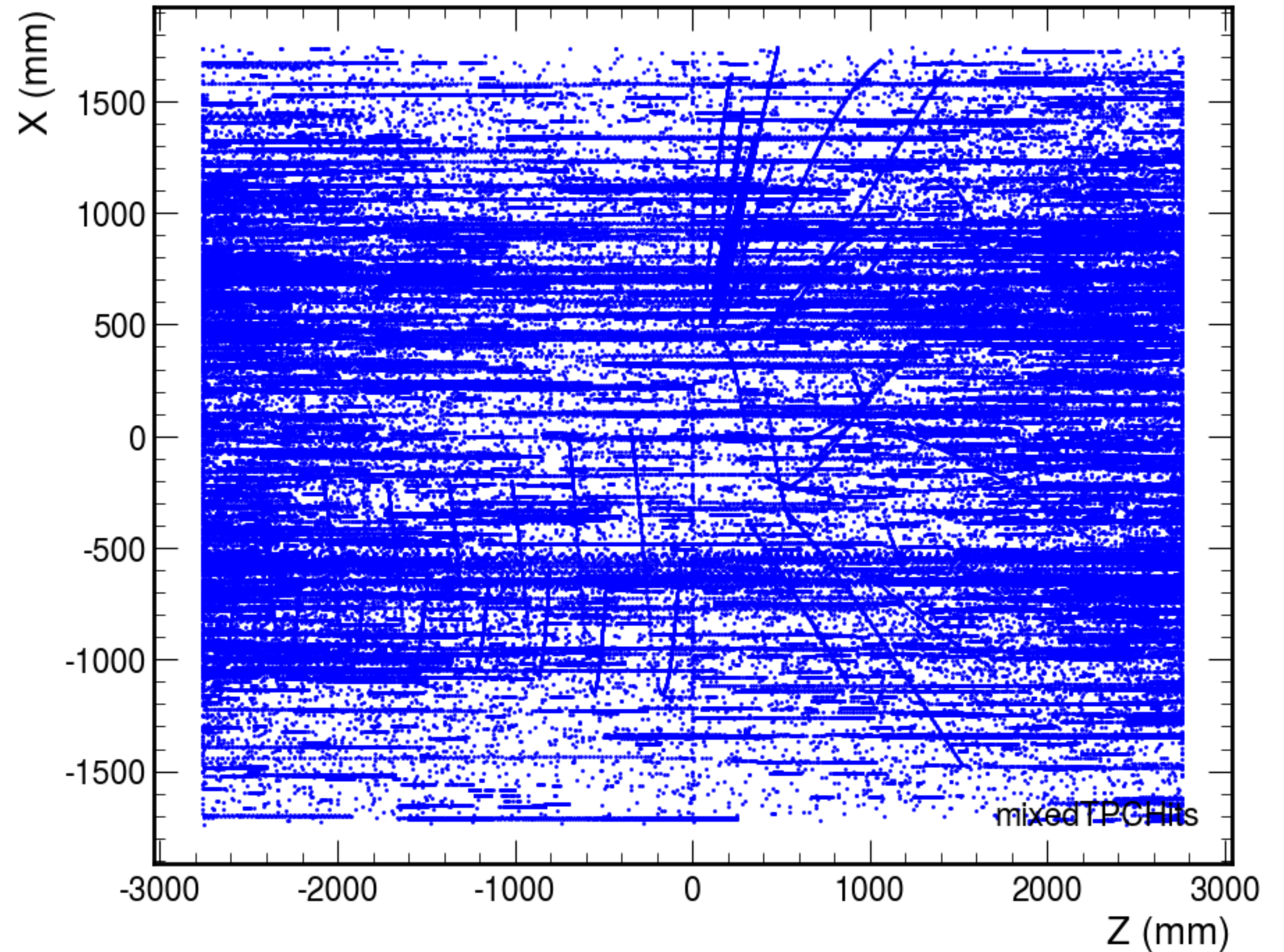
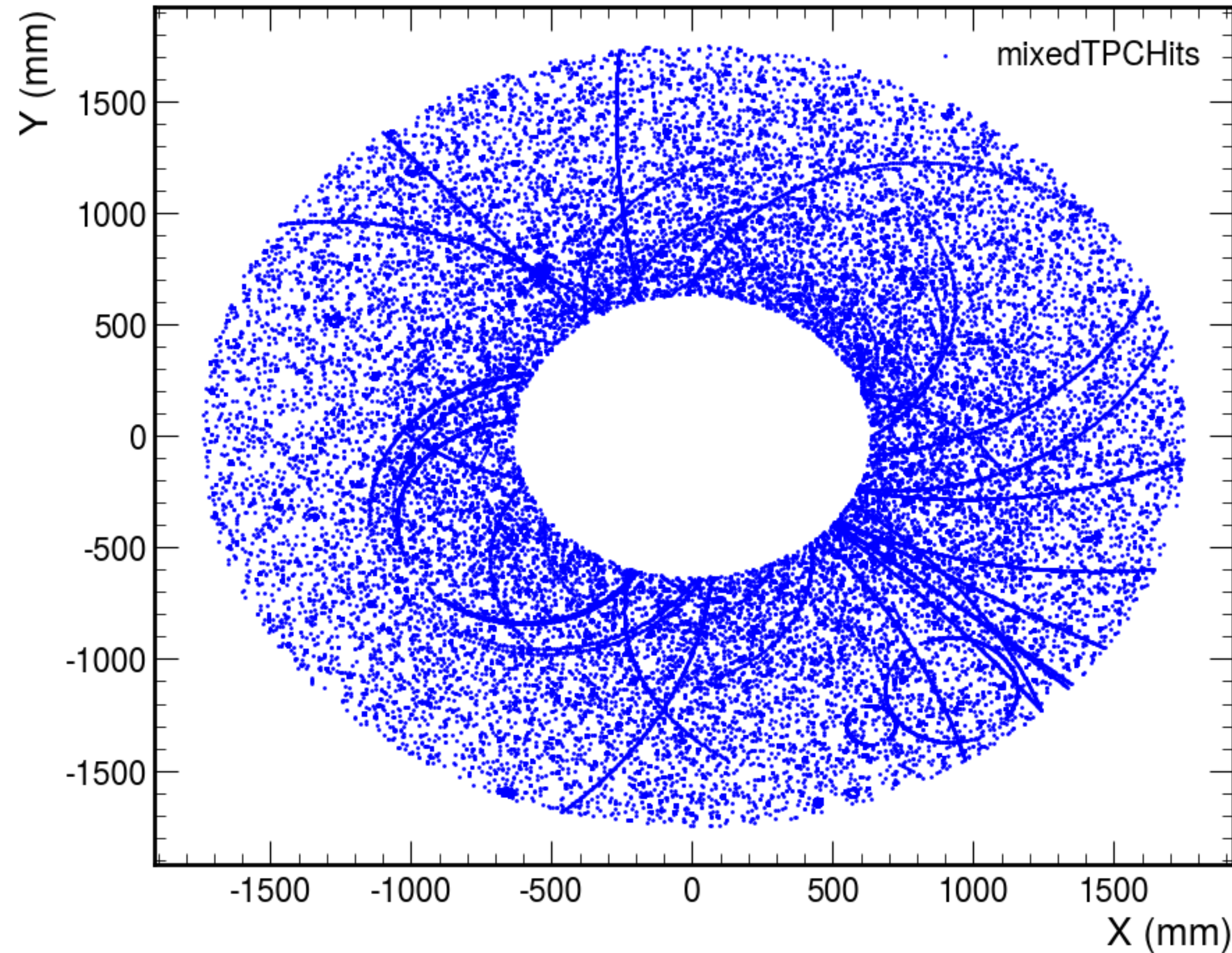
- **VXD and ITK time distributions; time-window 200 ns**
- **Only the bkg in the same BX as the signal is included**

Sanity plots



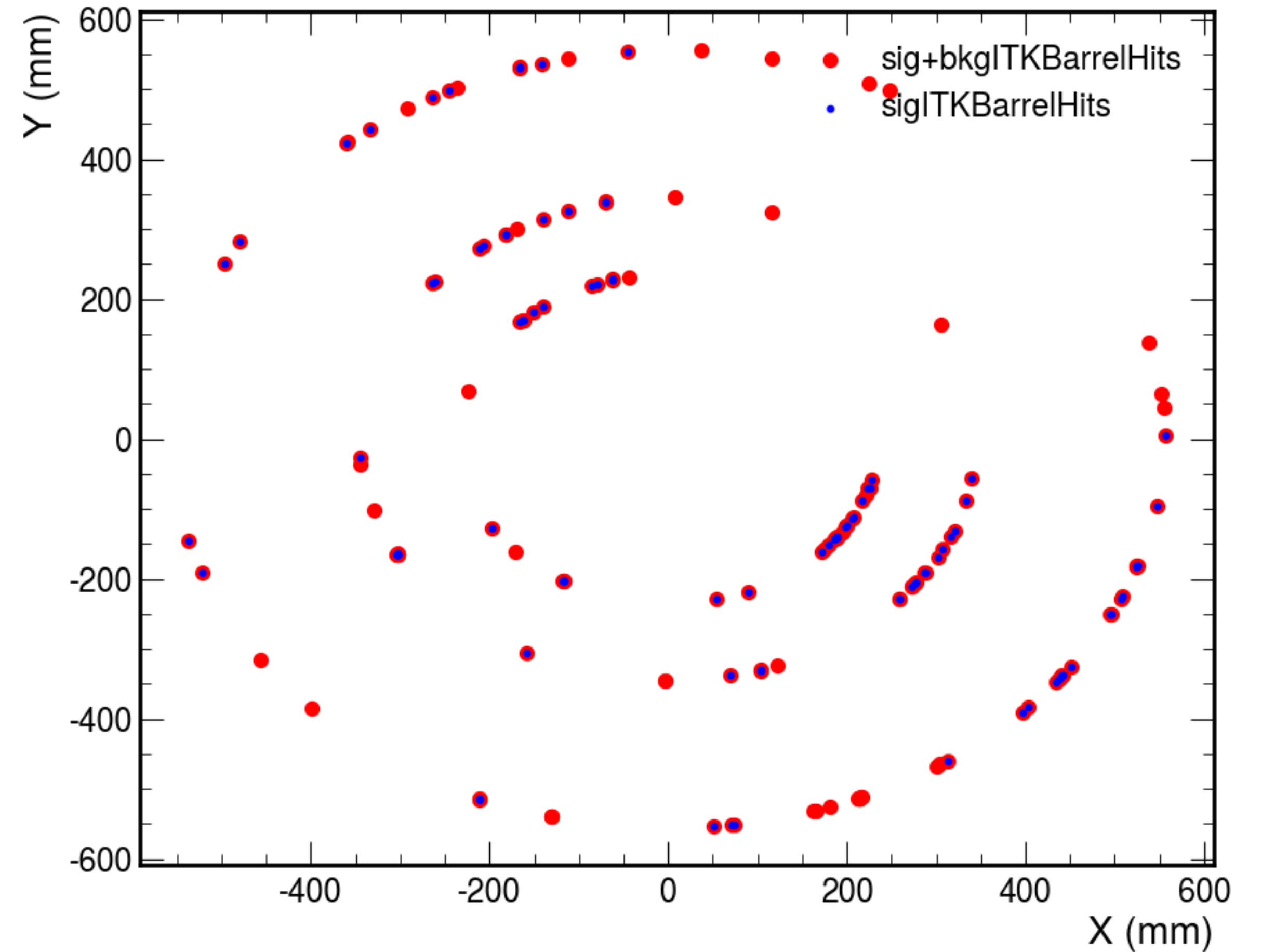
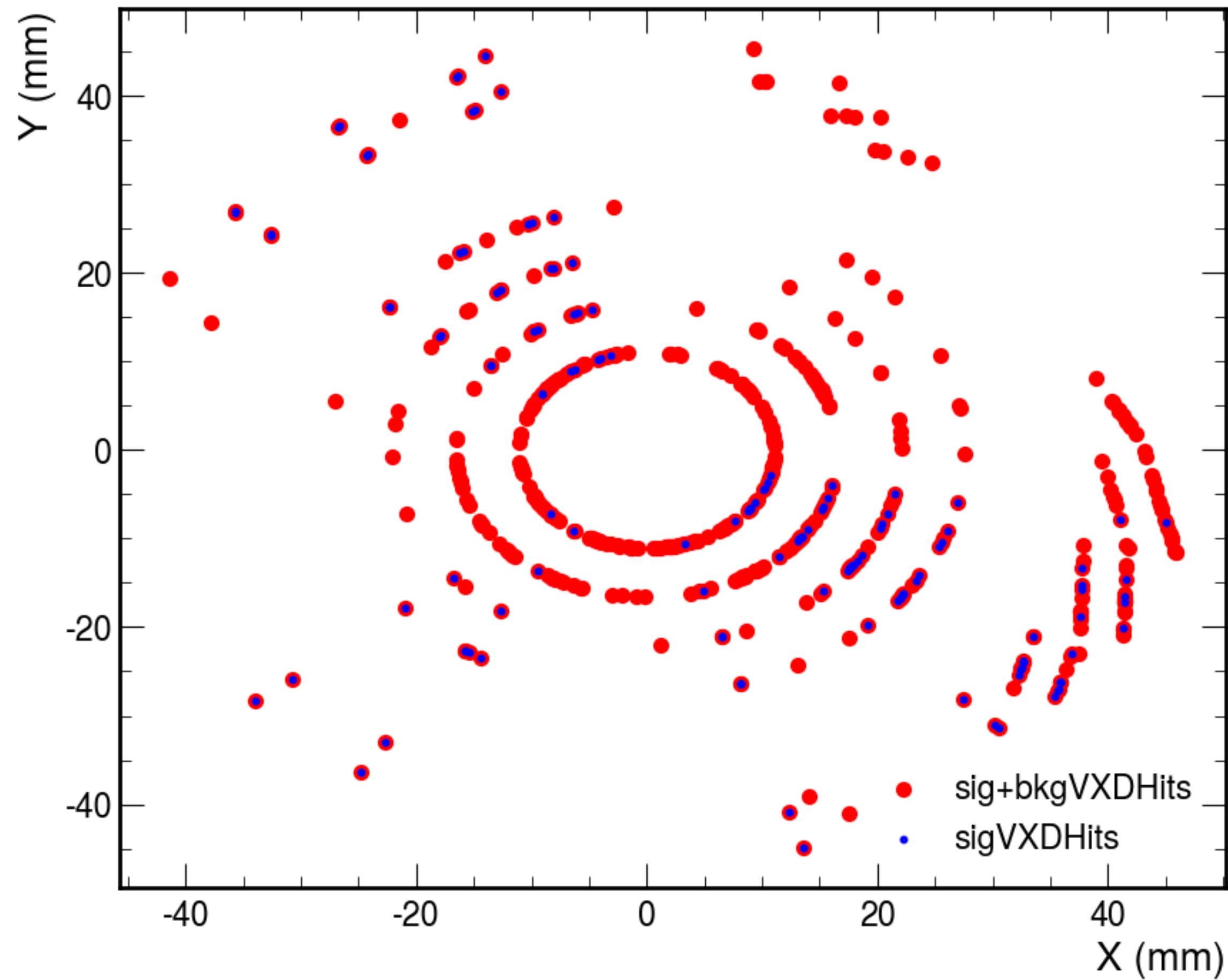
- OTK (1k ns), +/- 3 bx in the time-window
- TPC (34k ns), also as event-time-window, +/- 100 bx in the time-window

Sanity plots



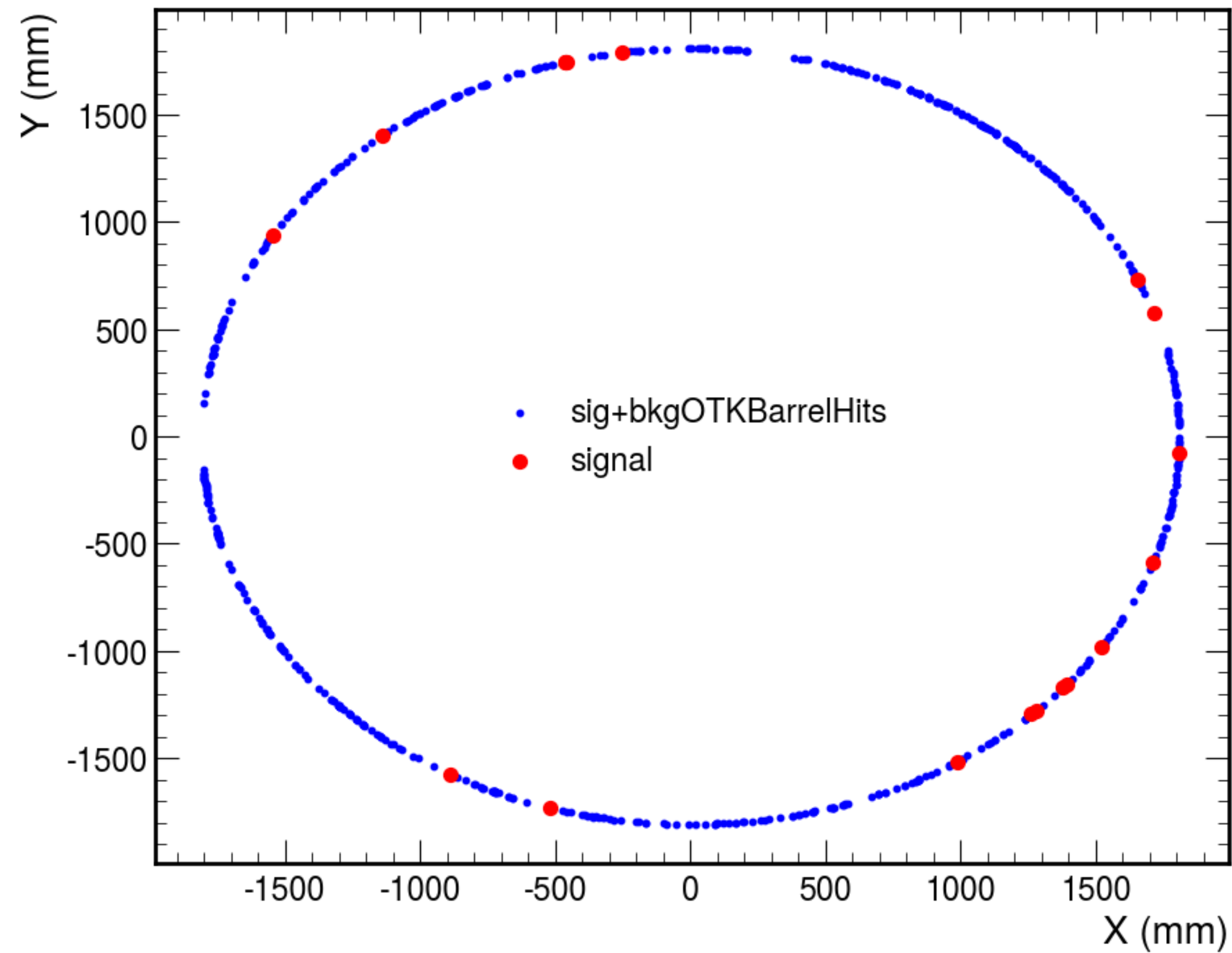
- **Sig + Bkg TPC hits distribution**
 - What are the horizontal lines in the Z-X?
 - Why are they dense in the endcap regions?
 - What is the middle vertical line in the Z-X?

Sanity plots



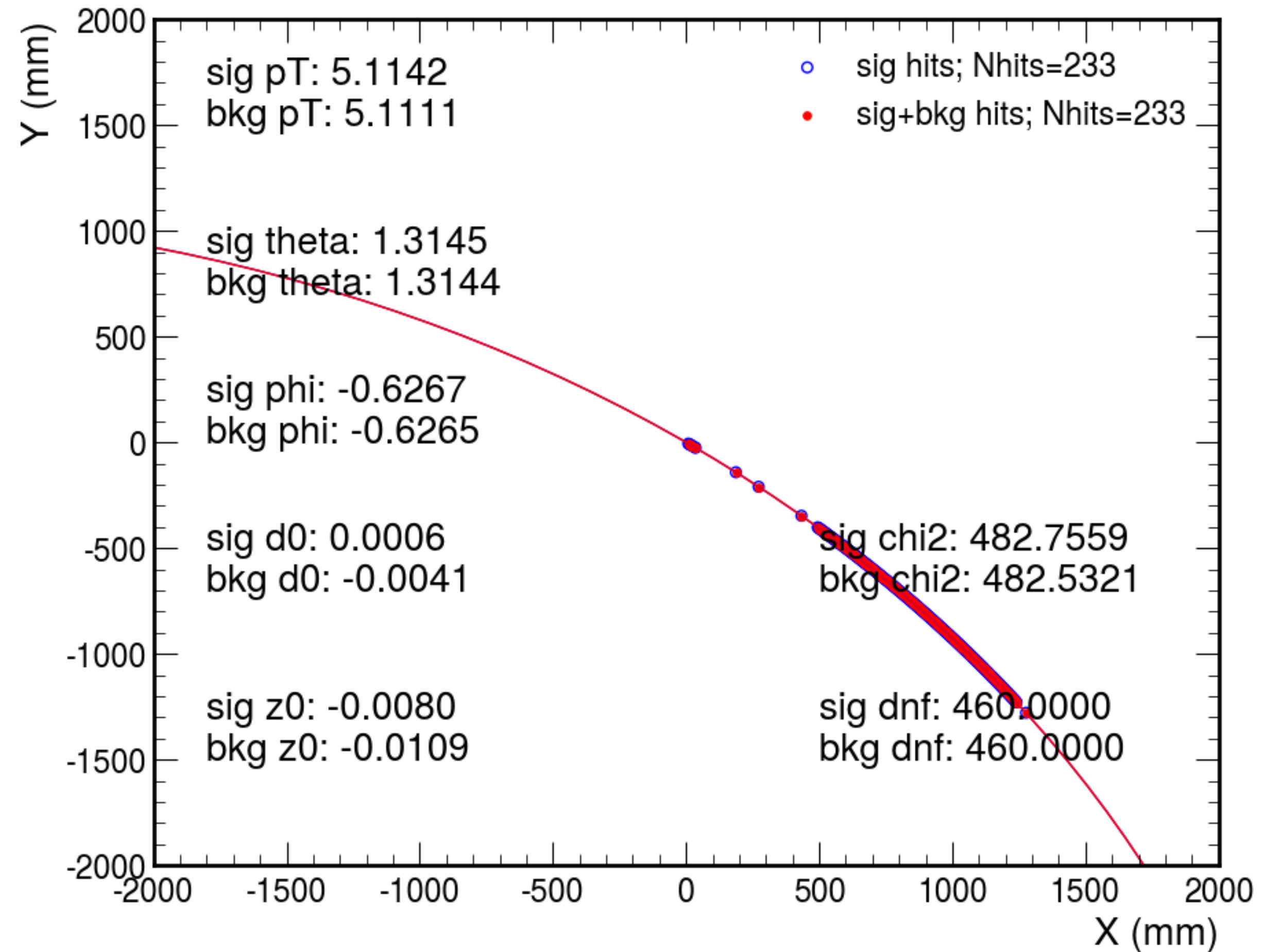
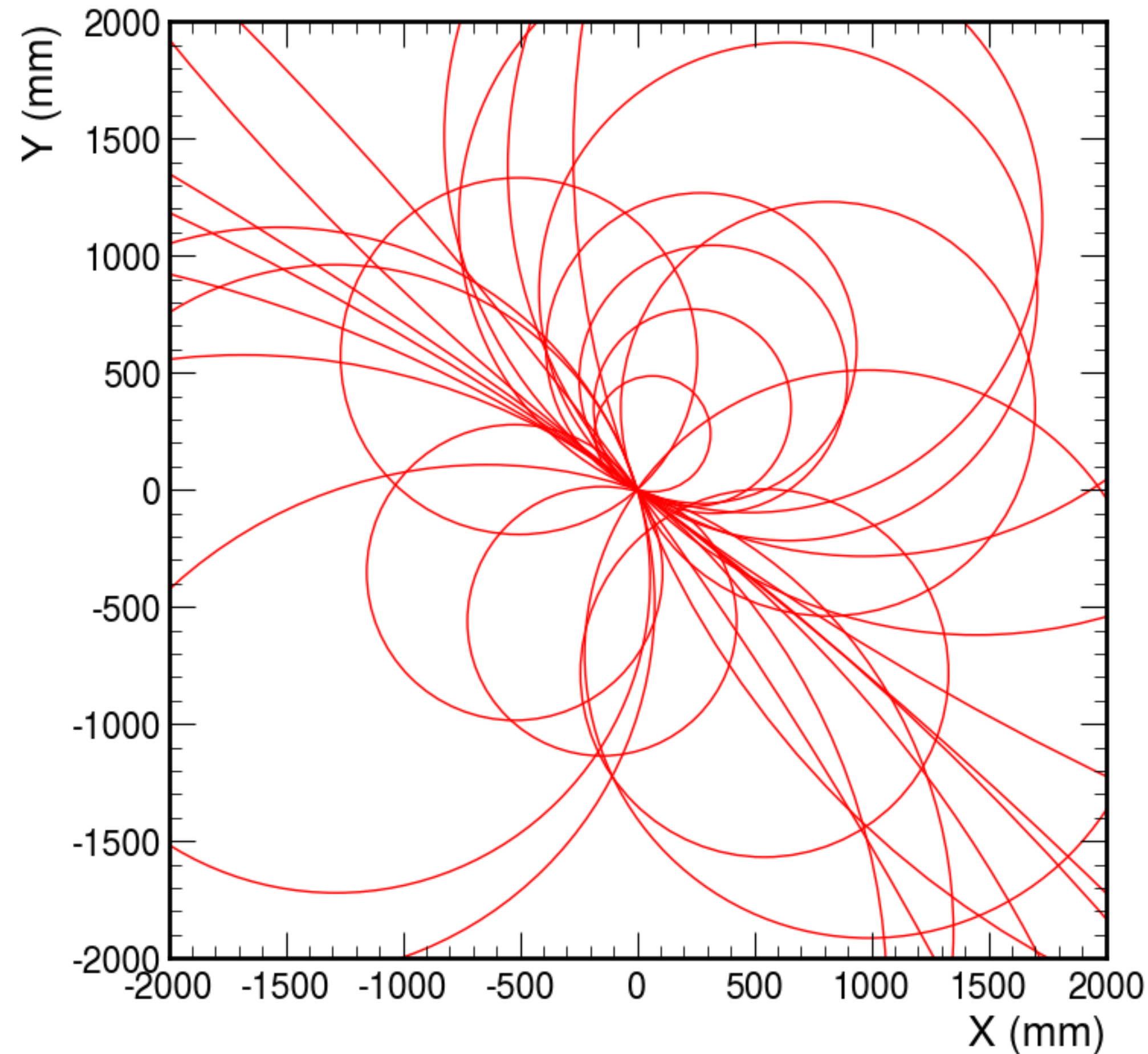
- **Sig + Bkg for VXD and ITK**

Sanity plots



- **OTK, denser than ITK and VXD, because of a 5 times longer time-window**

Sanity plots



- Tracks with a mixed signal (left), the 4th track (by pT, right)
- It seems that the background does not get involved in tracking

Todo

- **Need a better understanding of the TPC hit distribution**
- **Mixed-MCParticle is missing**
 - **Current MIX algo. doesn't cooperate with TPR algo.**
 - **No hit-level mcp-trk matching, no efficiency and fake rate**
- **Need to remove the impacts from digitization**
- **Some ERRORS occur in trakcing (only with sig+bkg)**

```
657 TDecompLU::Inve... ERROR matrix is singular, 0 diag elements < tolerance of 2.2251e-308
658 TDecompLU::Deco... ERROR matrix is singular
659 TDecompLU::Inve... ERROR matrix is singular, 0 diag elements < tolerance of 2.2251e-308
660 TDecompLU::Deco... ERROR matrix is singular
661 TDecompLU::Inve... ERROR matrix is singular, 0 diag elements < tolerance of 2.2251e-308
662 TDecompLU::Deco... ERROR matrix is singular
663 TDecompLU::Inve... ERROR matrix is singular, 0 diag elements < tolerance of 2.2251e-308
664 TDecompLU::Deco... ERROR matrix is singular
665 TDecompLU::Inve... ERROR matrix is singular, 0 diag elements < tolerance of 2.2251e-308
666 TDecompLU::Deco... ERROR matrix is singular
667 TDecompLU::Inve... ERROR matrix is singular, 0 diag elements < tolerance of 2.2251e-308
668 EventLoopMgr      SUCCESS Terminating event processing loop due to scheduled stop
```