

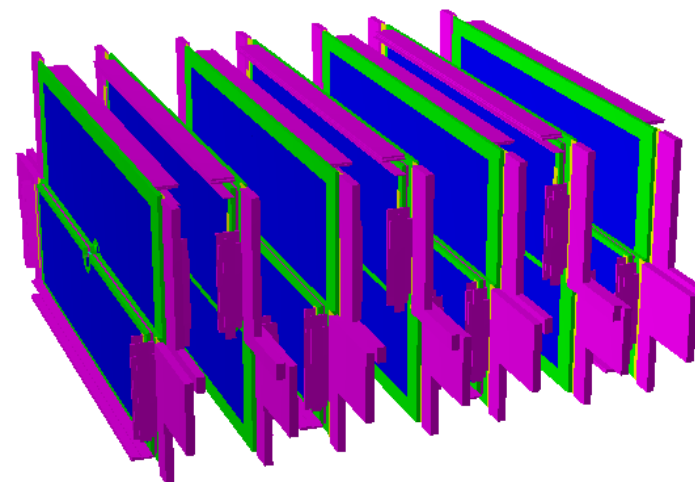
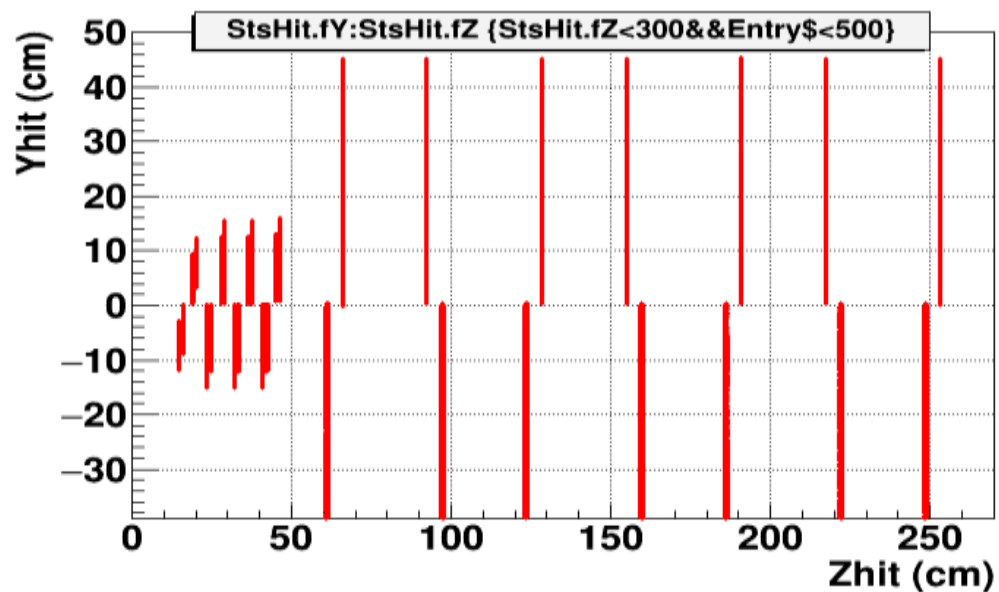
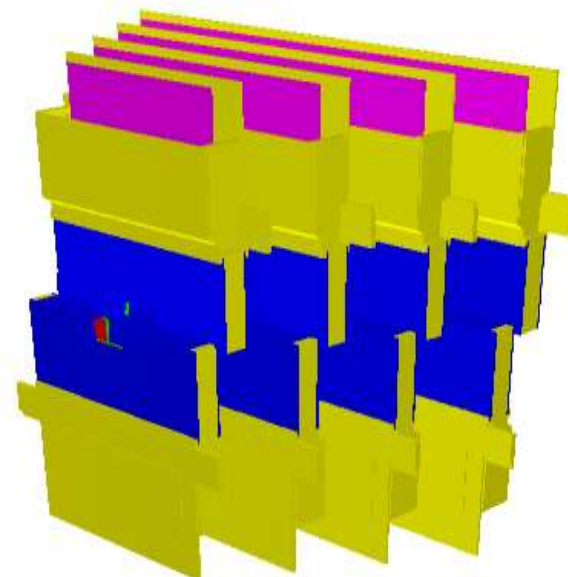
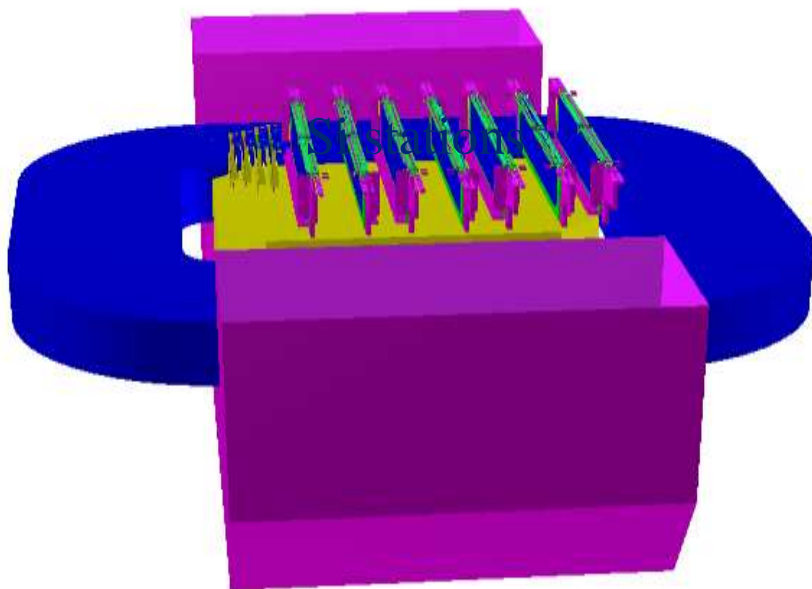
Λ and K_s^0 reconstruction in Run 8 (Xe+CsI)

J.Drnoyan, V.Vasendina, A.Zinchenko, D.Zinchenko, R.Zinchenko
VBLHEP, JINR, Dubna, Russia



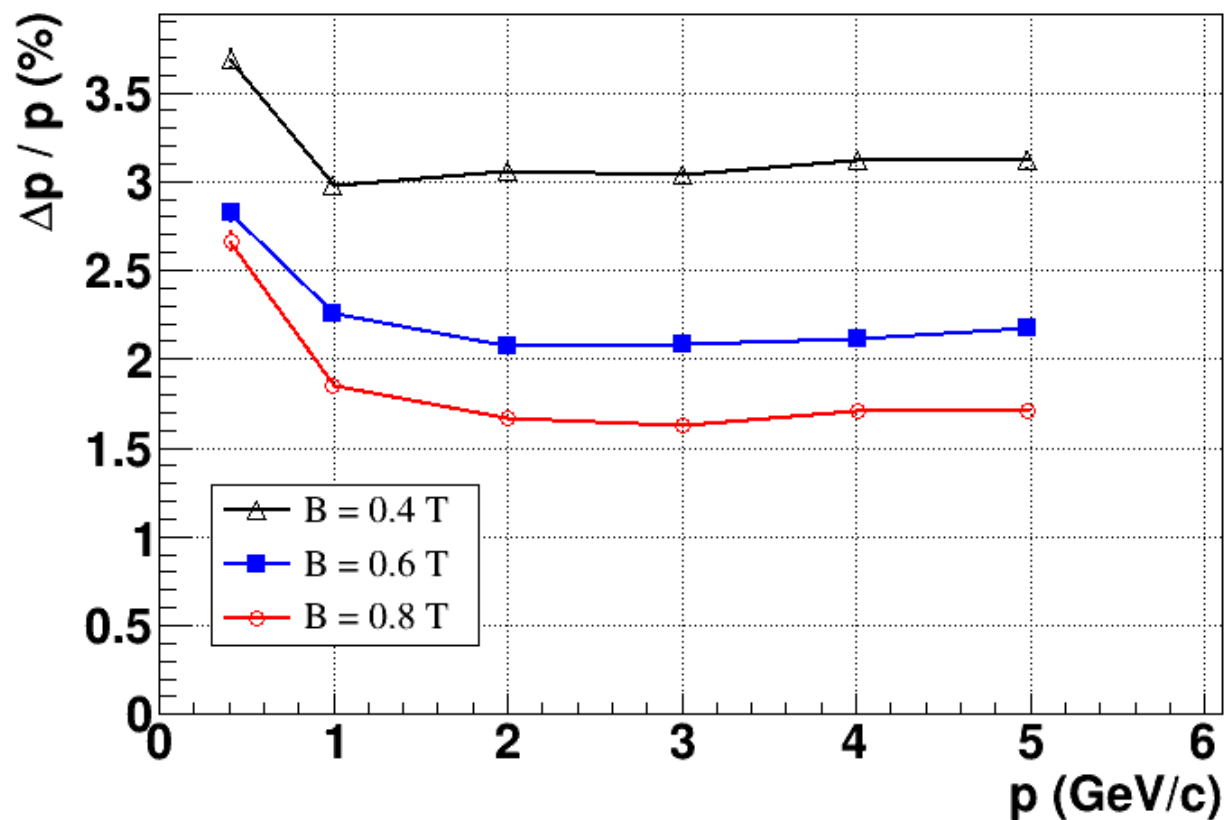
- ✓ BM@N configuration
- ✓ Track reconstruction, detector alignment
- ✓ Λ reconstruction: Data vs MC
- ✓ K_s^0 reconstruction
- ✓ Background evaluation
- ✓ Summary and next steps

Detector geometry in Run 8



- ✓ CAT (L1) track reconstruction – legacy code from the CBM experiment
- ✓ Vector Finder (VF)– homemade (import substitution) package
- ✓ L1 demonstrates higher efficiency at 4 kG, VF at 6 and 8 kG
- ✓ VF allows missing stations on tracks (jump over station) – except for the next to the first one

Tracker performance



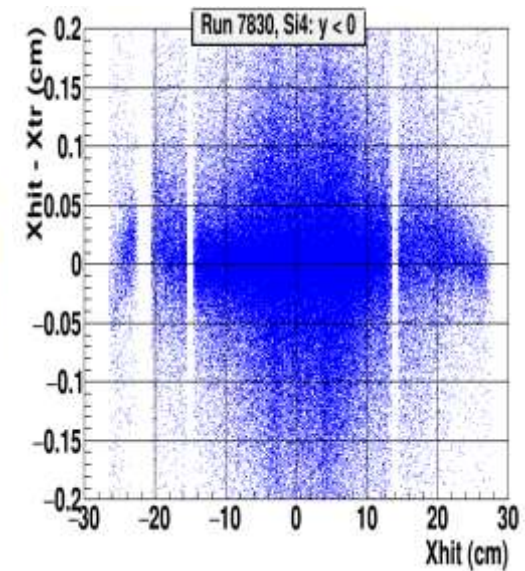
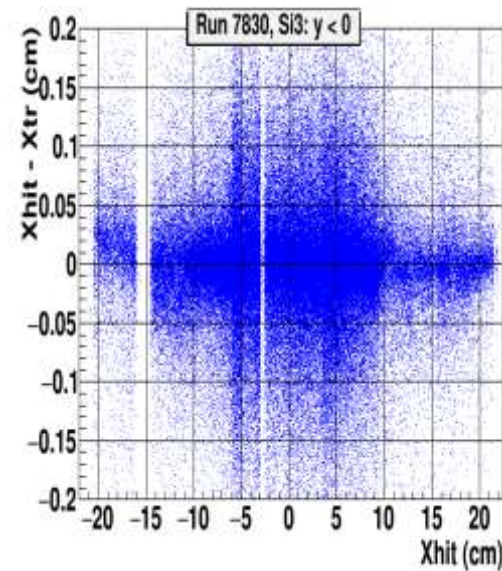
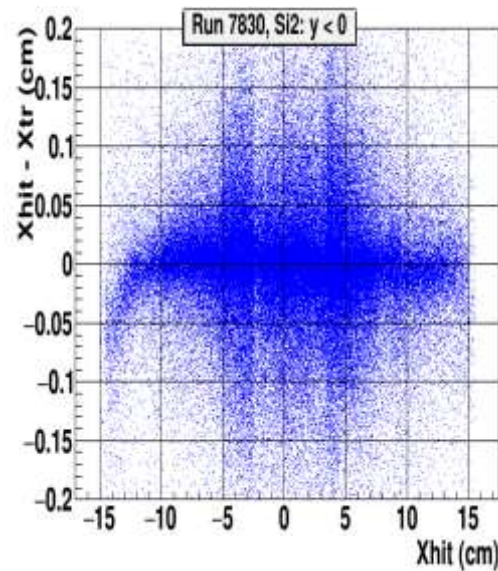
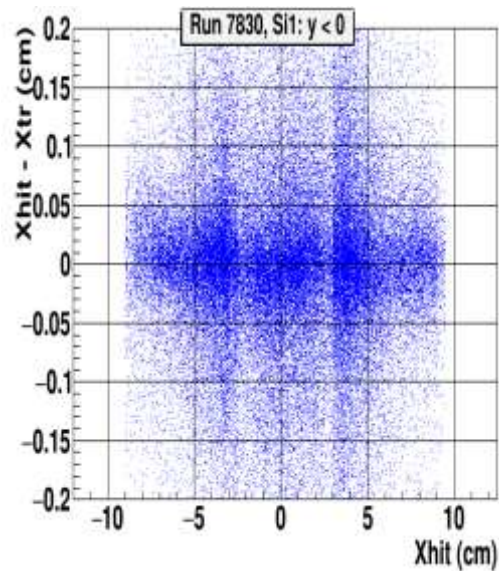
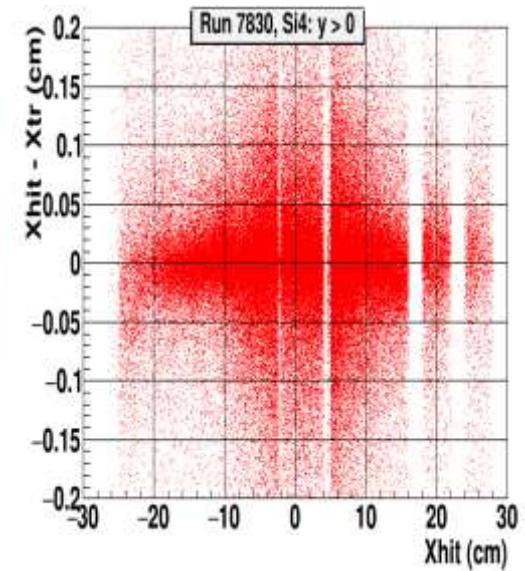
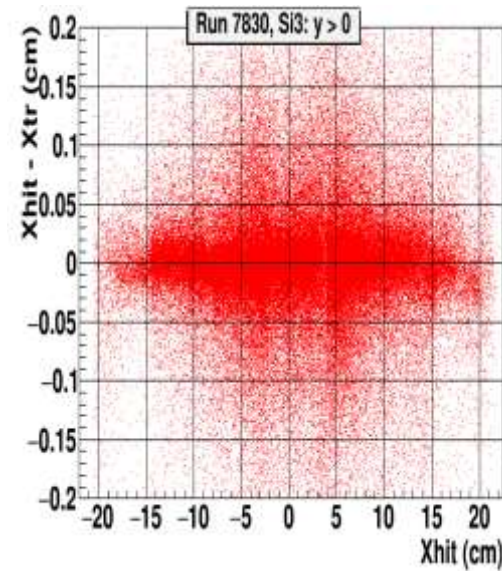
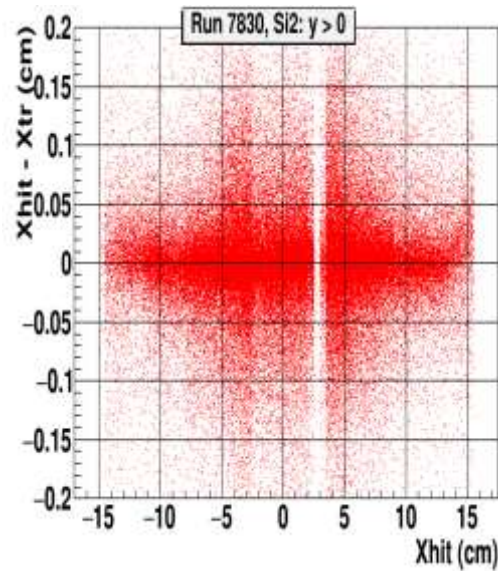
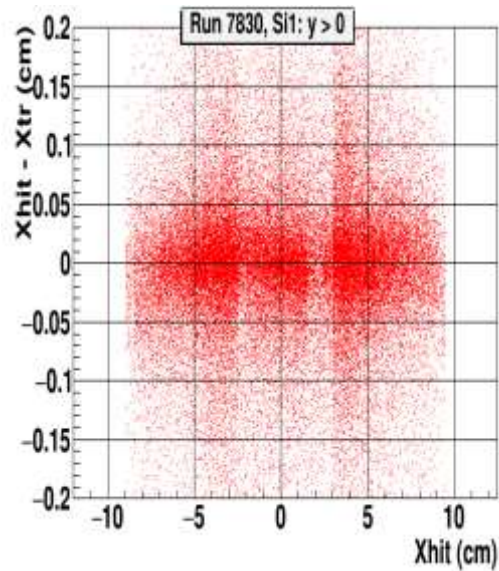
MC:

- ✓ **Generator:** DCM-SMM, Xe+Cs @ 3.8A GeV, Min. bias, 50k events
- ✓ **Transport:** GEANT4
- ✓ **Detectors:** 4 Si + 7 GEM + beam pipe (all materials)
- ✓ **Track reconstruction:** new Vector Finder

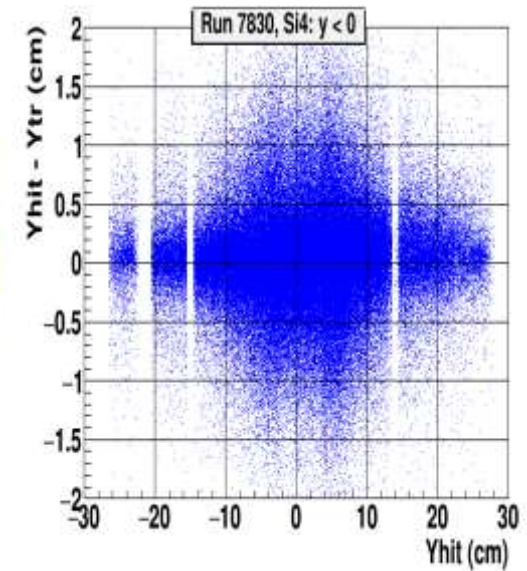
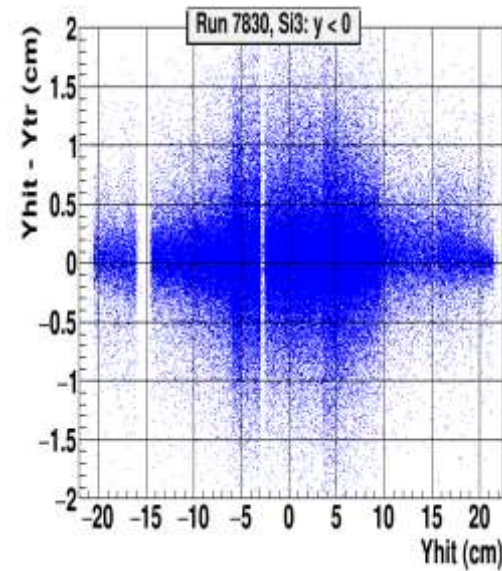
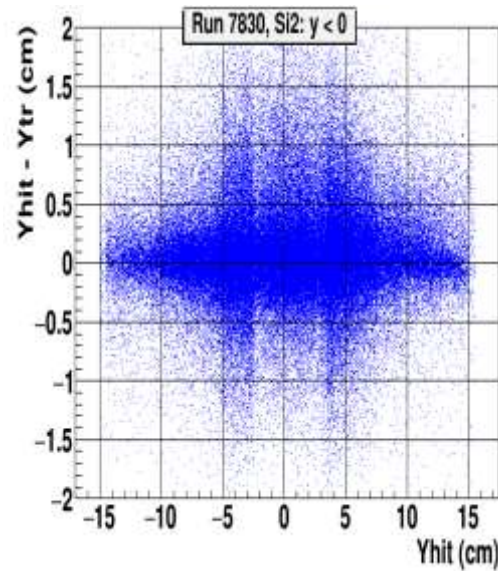
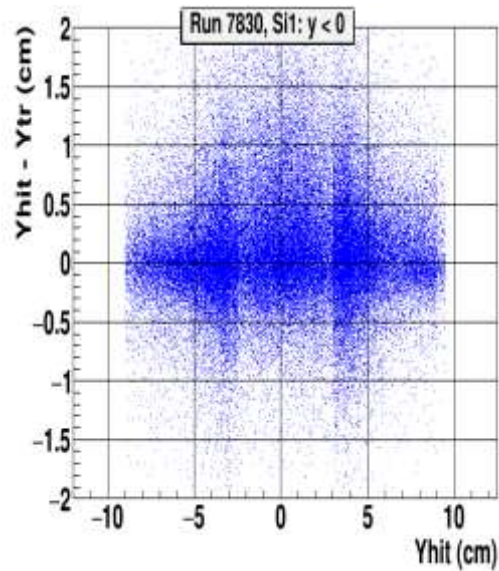
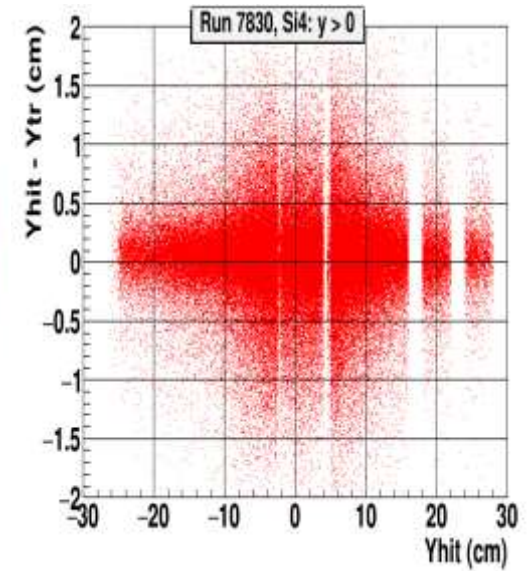
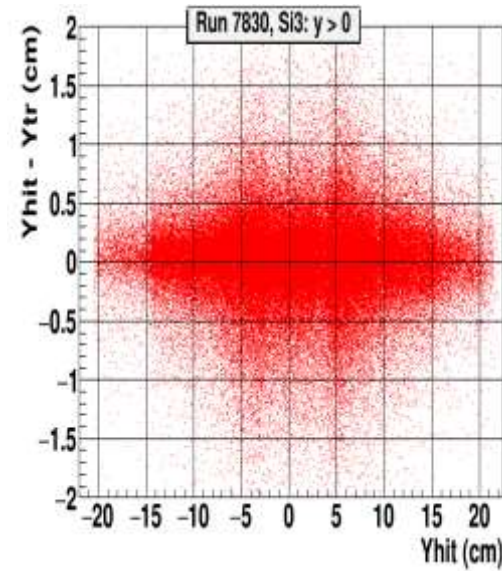
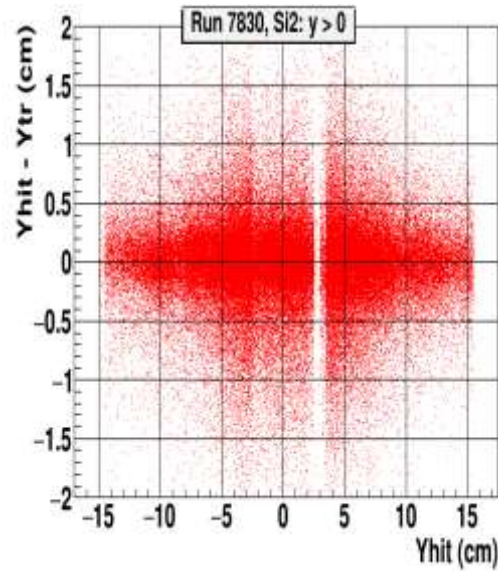
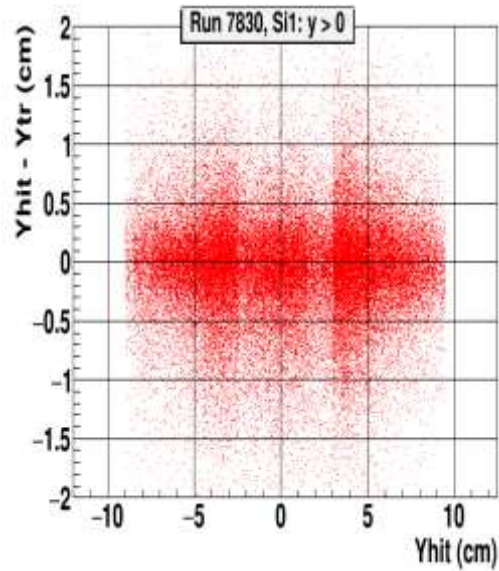
Data:

- ✓ **Run:** 7830, 500k events (330k events with Ntracks>1)
- ✓ **Track reconstruction:** new Vector Finder

Run 7830 Si ($B \neq 0$, current alignment)



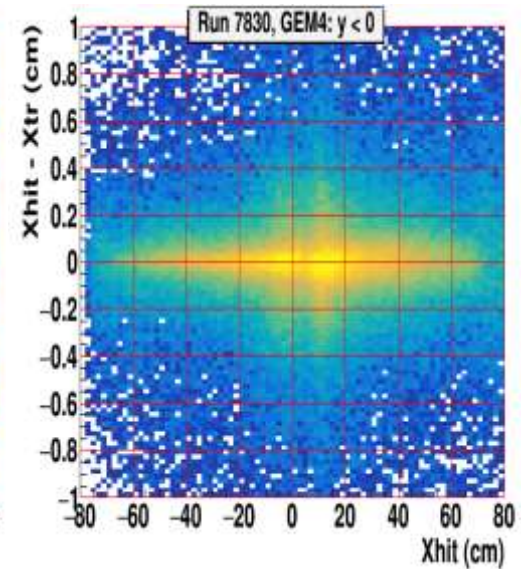
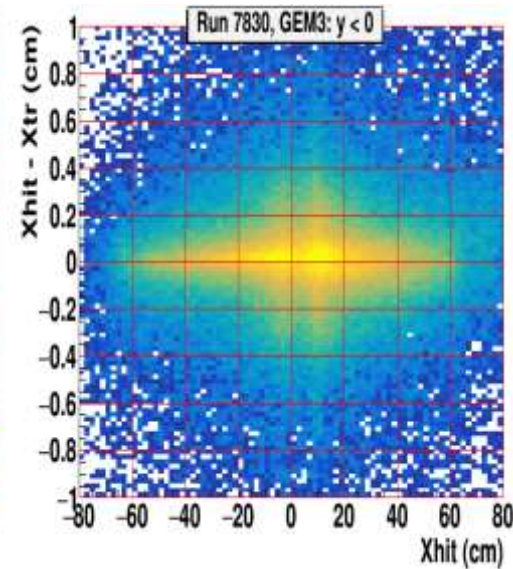
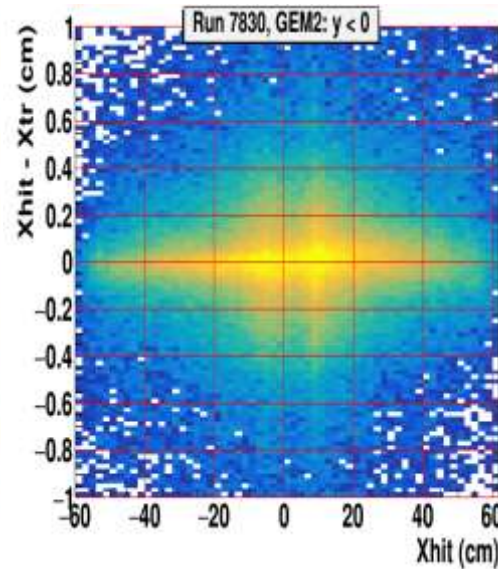
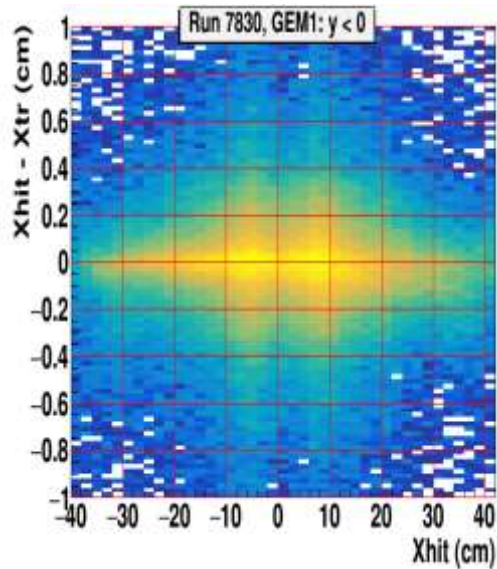
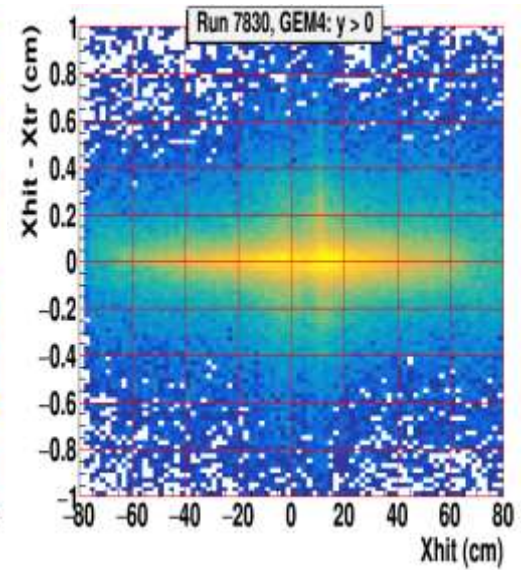
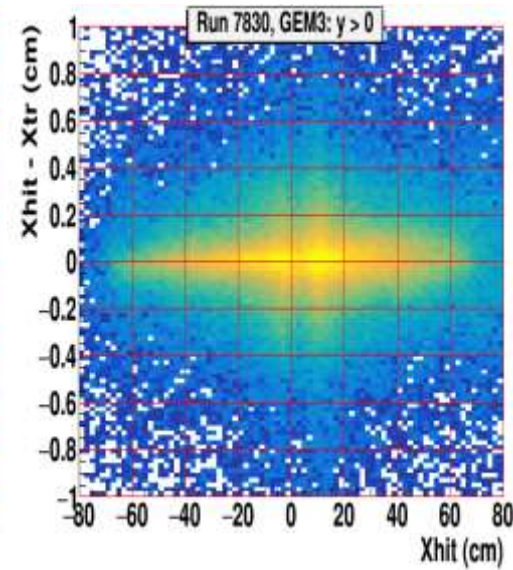
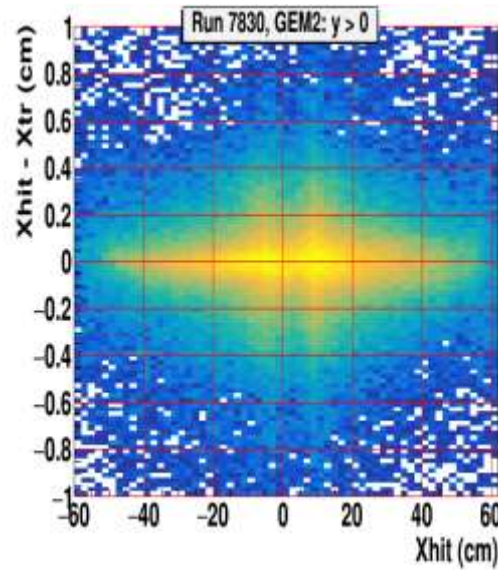
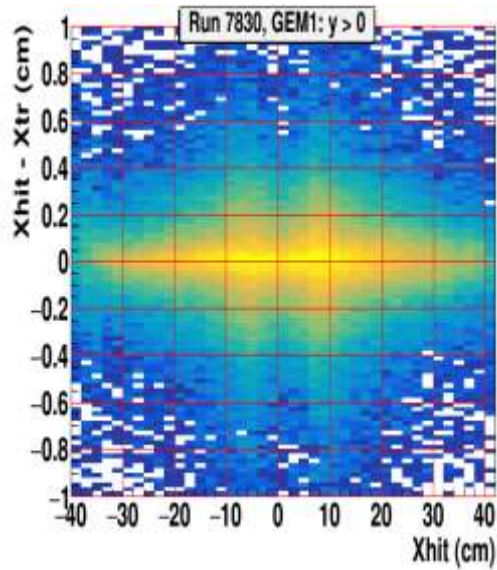
Run 7830 Si ($B \neq 0$, current alignment)



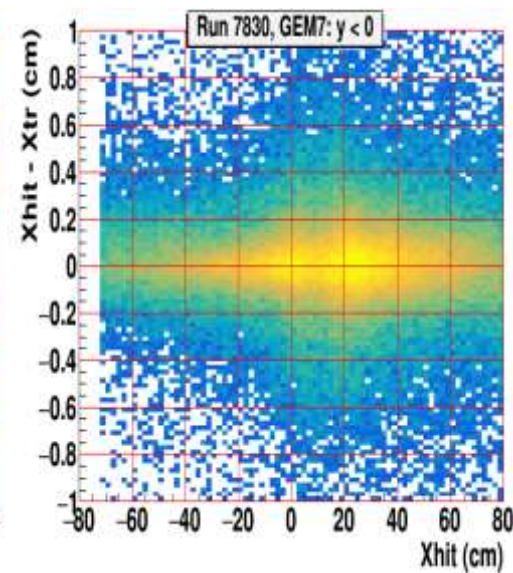
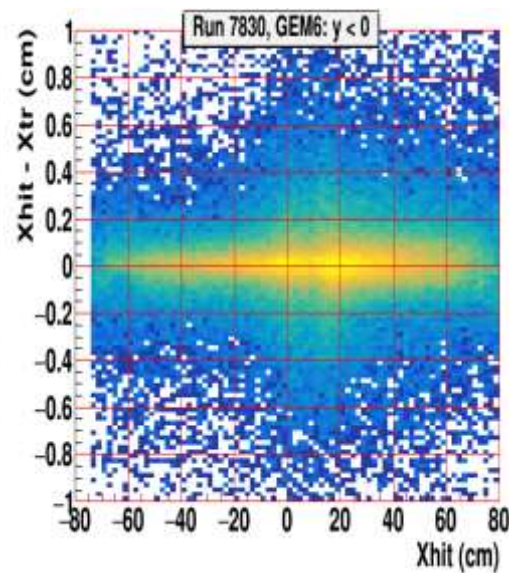
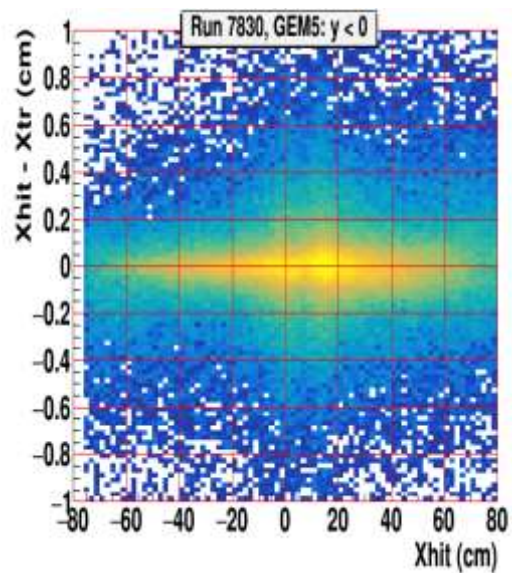
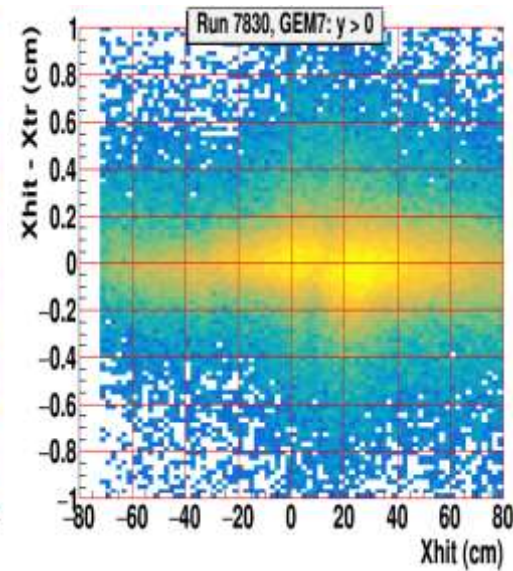
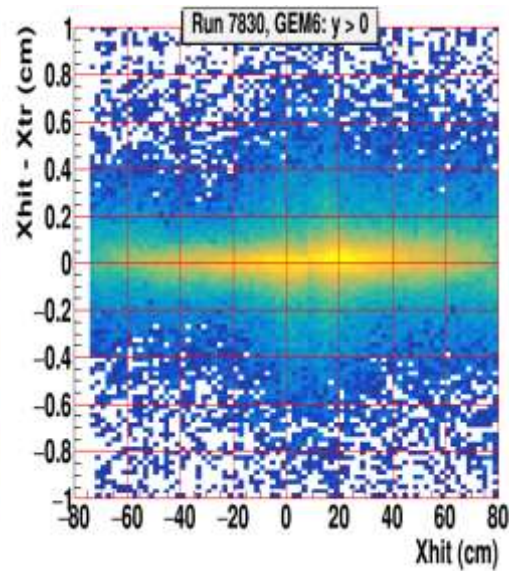
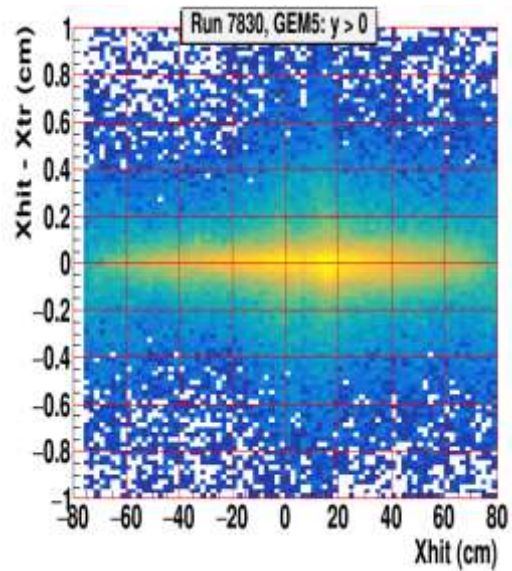
Run 7830 GEM (B \neq 0, current alignment)



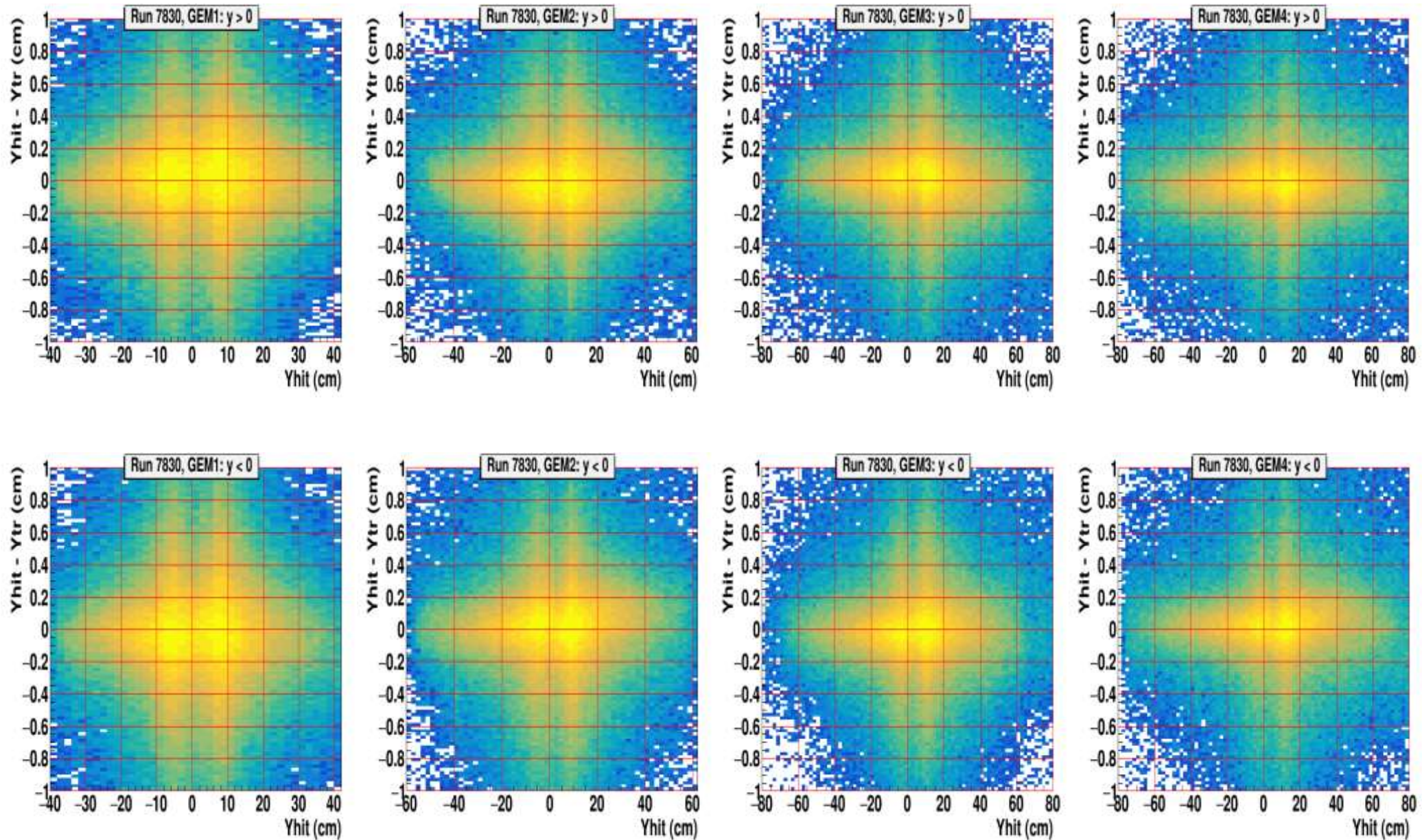
+ I. Rufanov



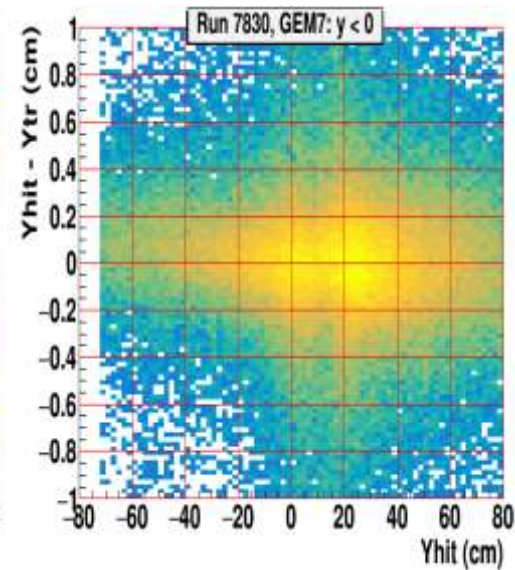
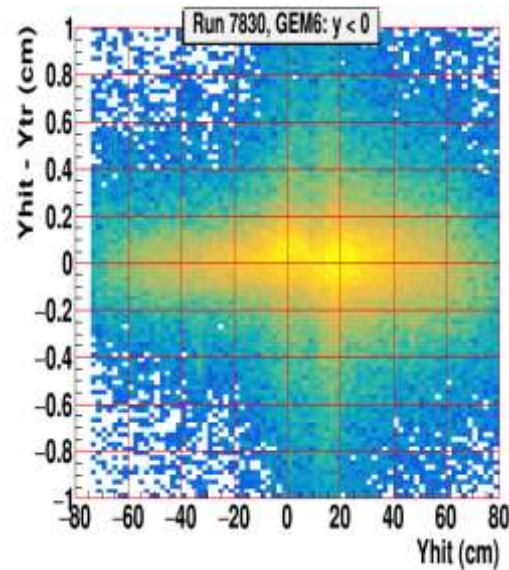
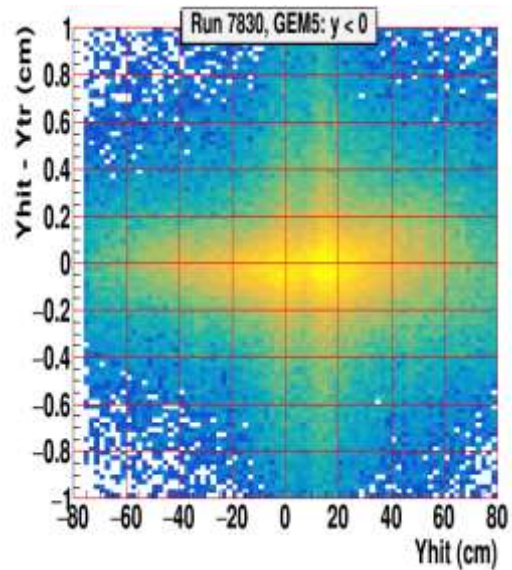
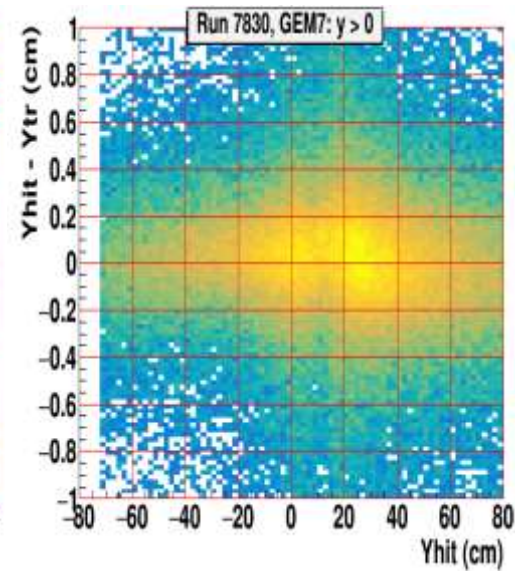
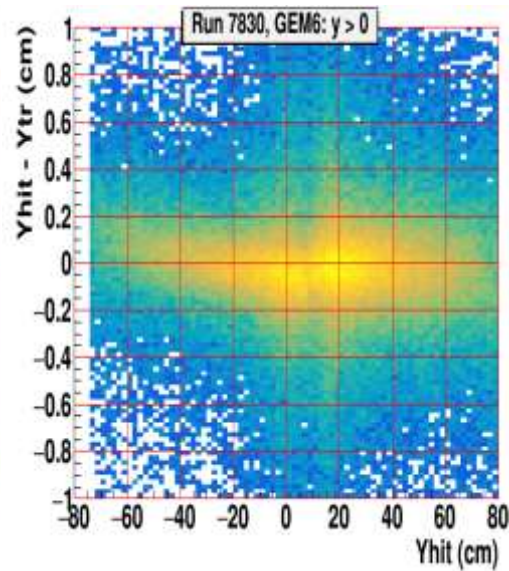
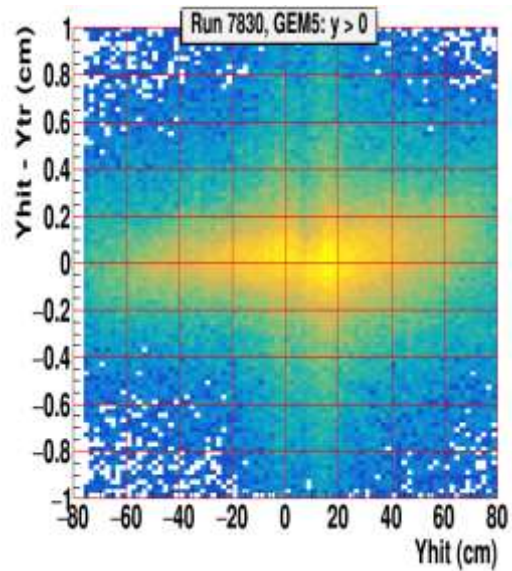
Run 7830 GEM (B \neq 0, current alignment)



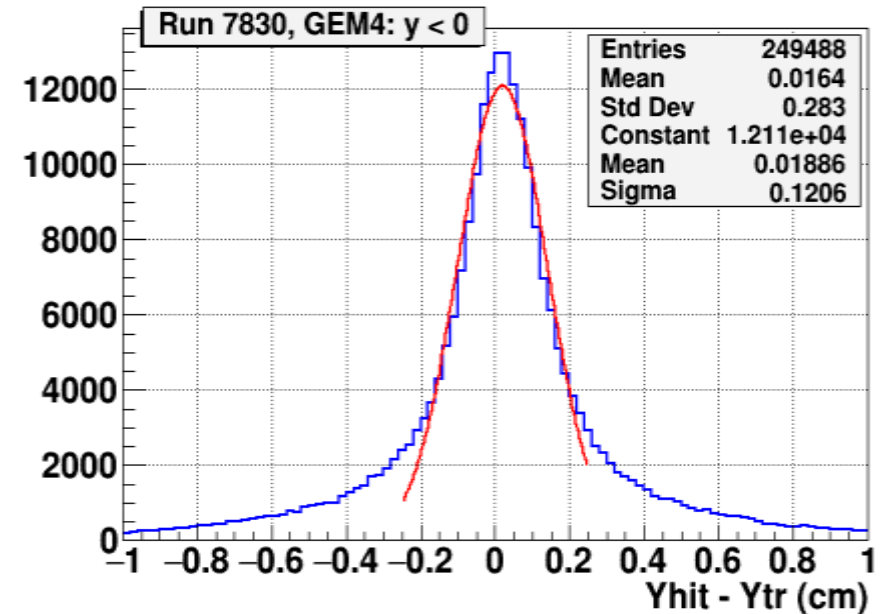
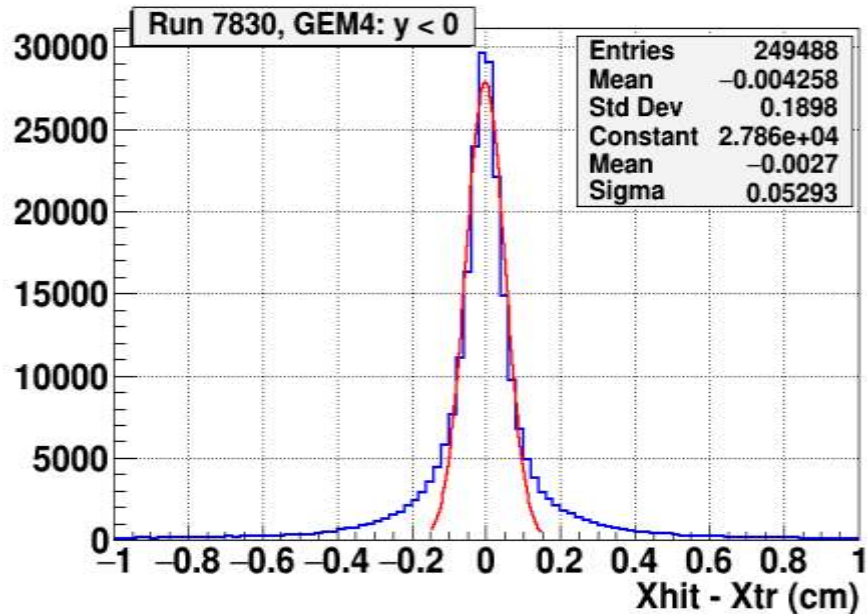
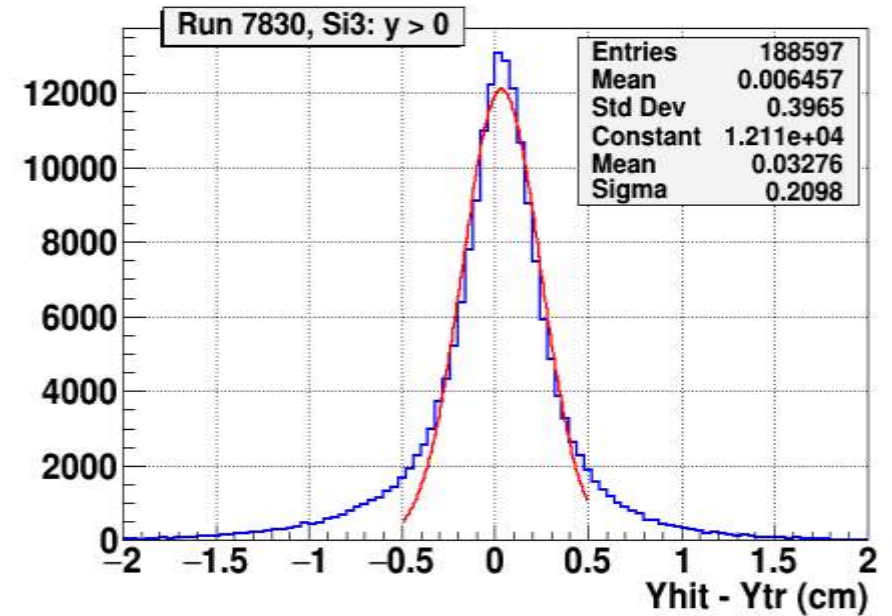
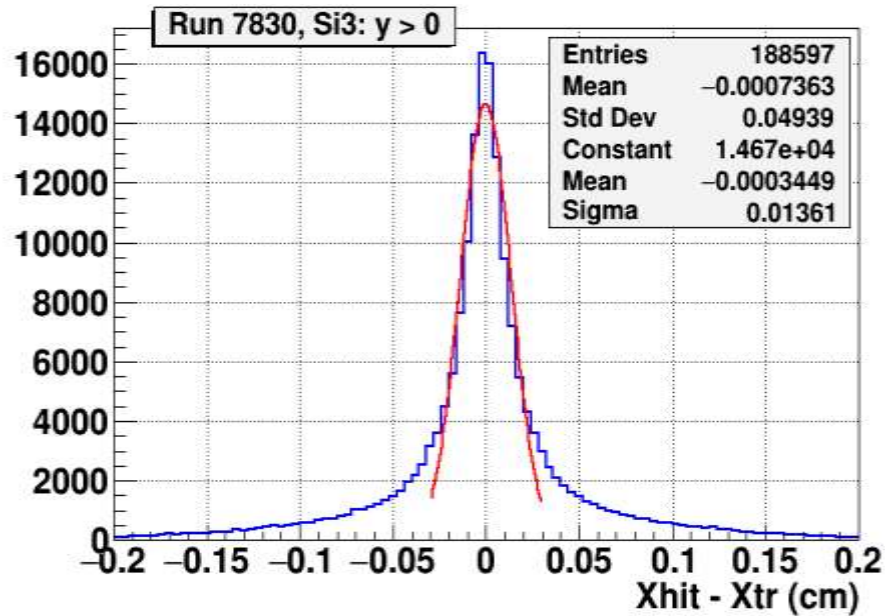
Run 7830 GEM (B \neq 0, current alignment)



Run 7830 GEM (B \neq 0, current alignment)



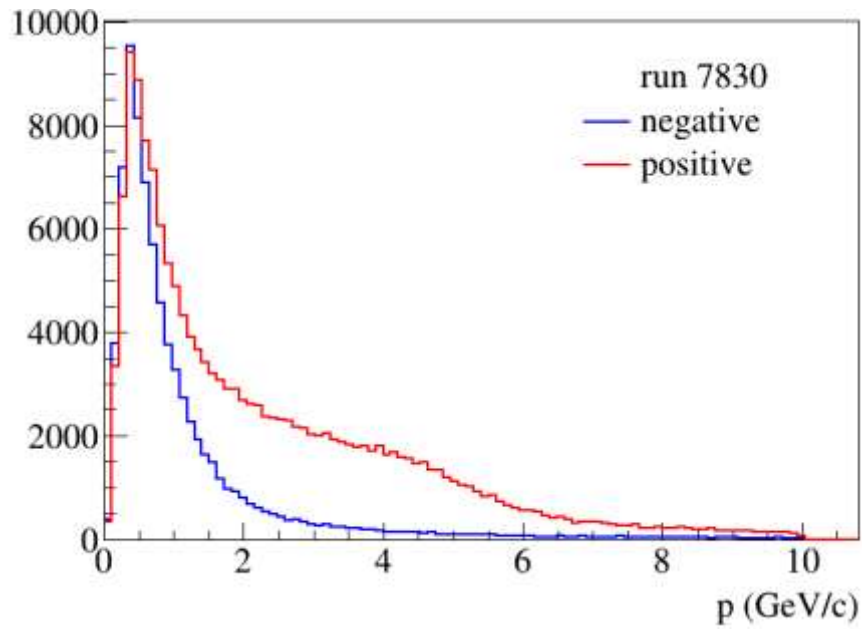
Run 7830 (B \neq 0, current alignment)



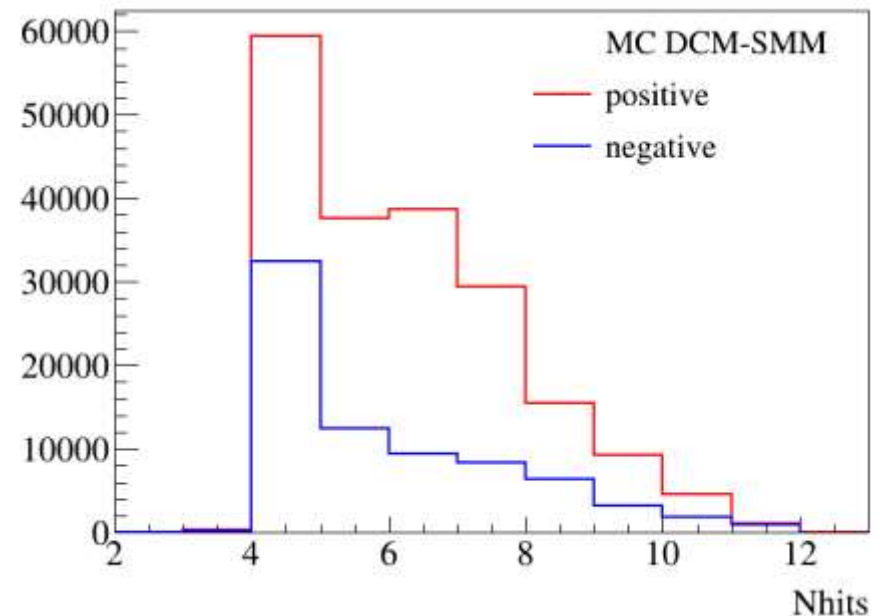
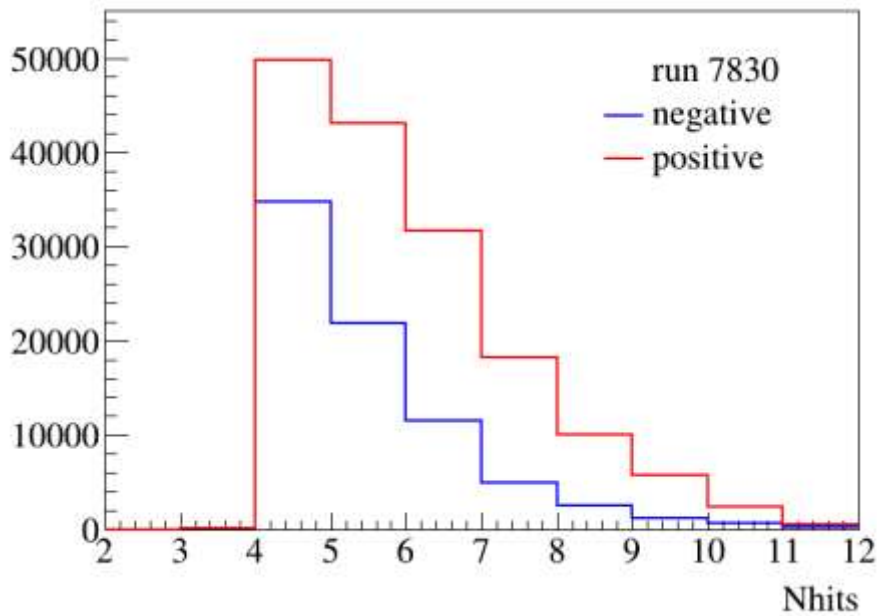
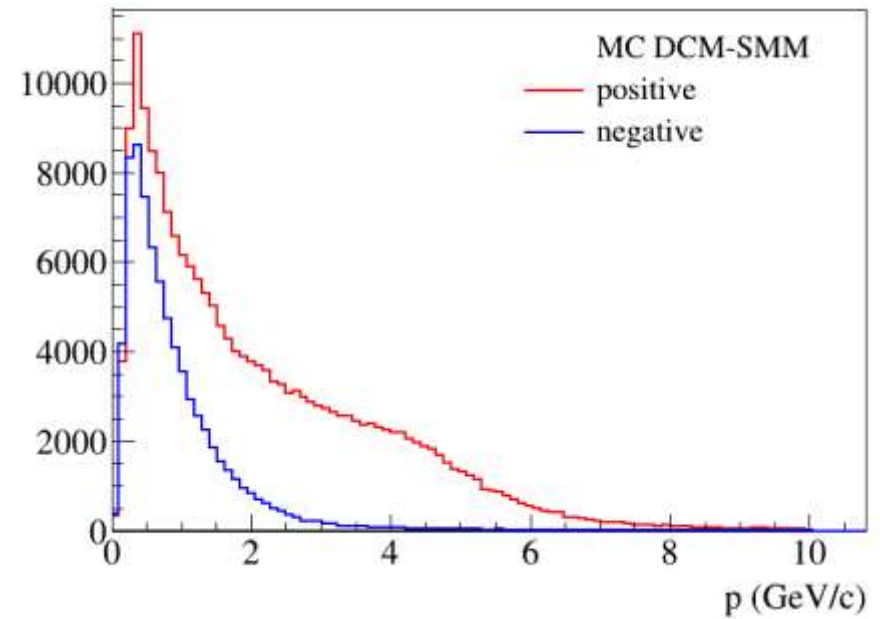
Events: Data vs MC, 5k



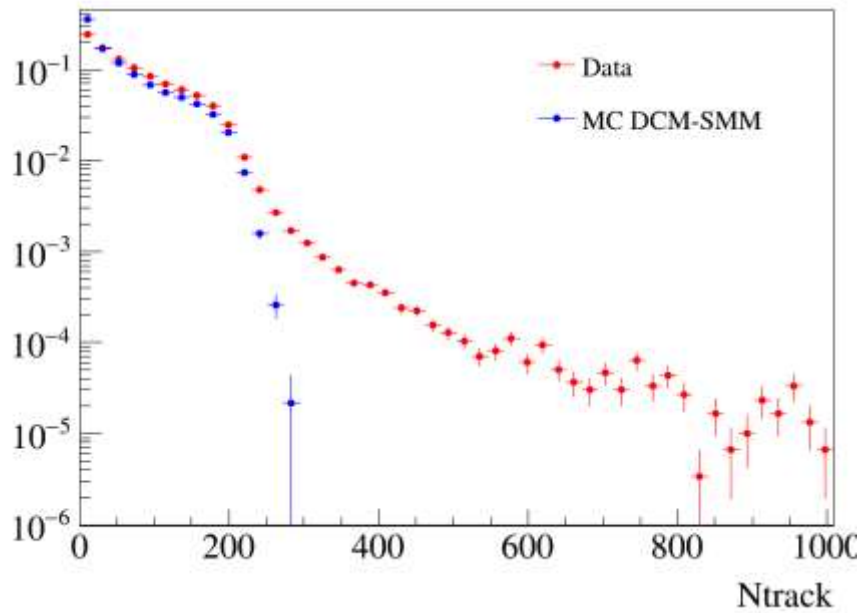
Data



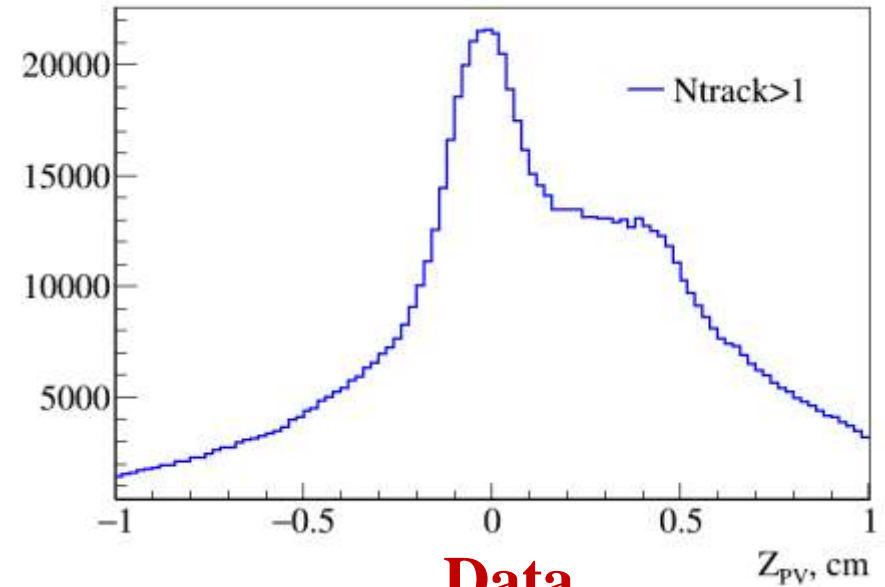
MC



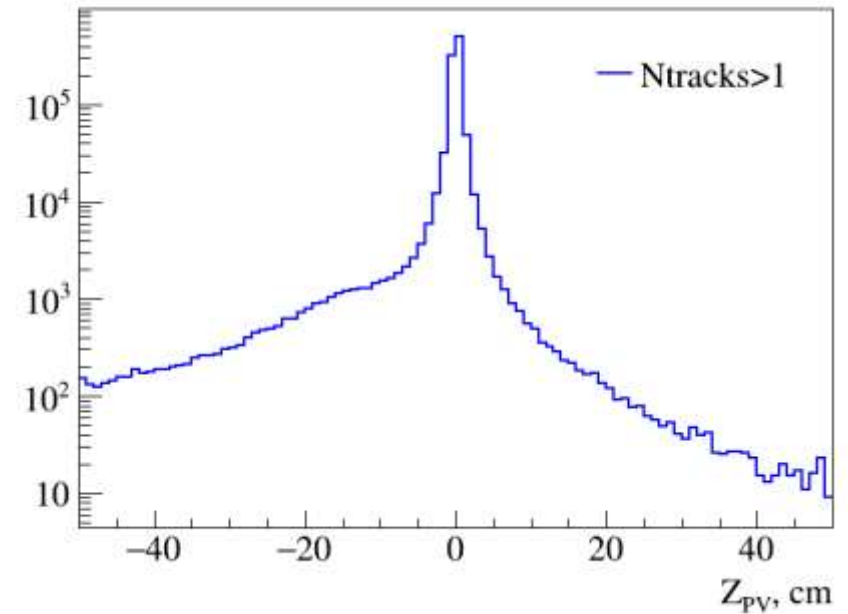
Events: Data vs MC, 5k



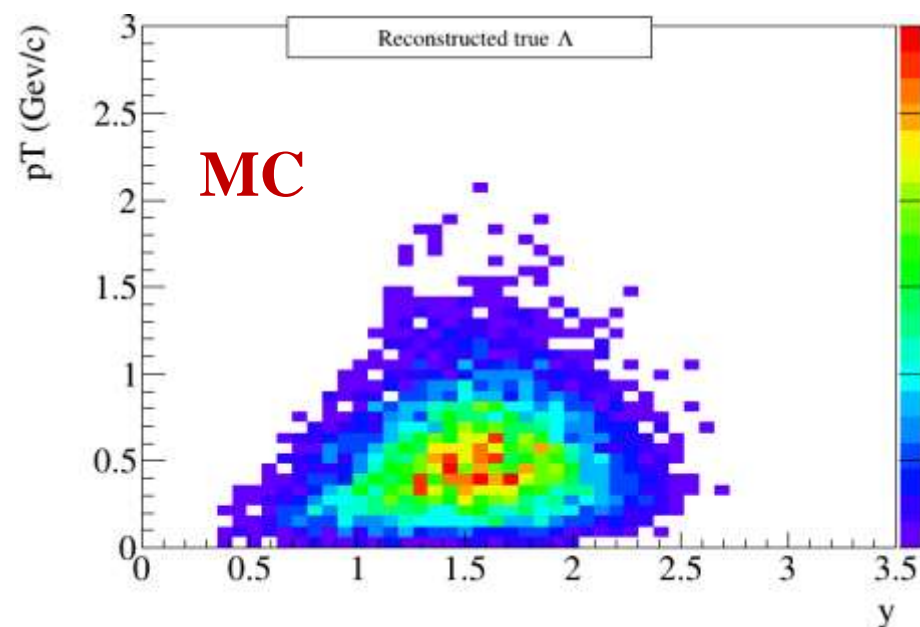
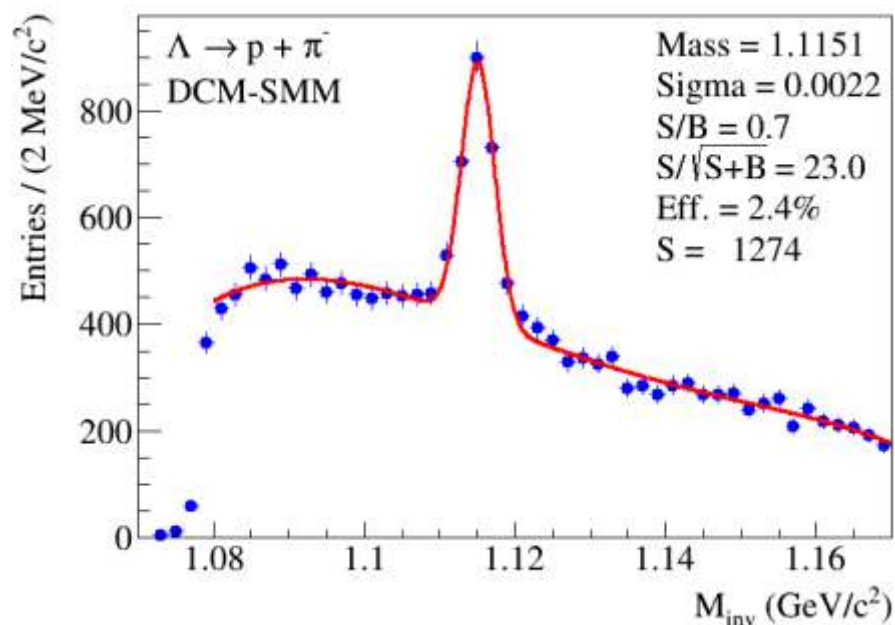
Ntracks>1, Normalized per event



Data

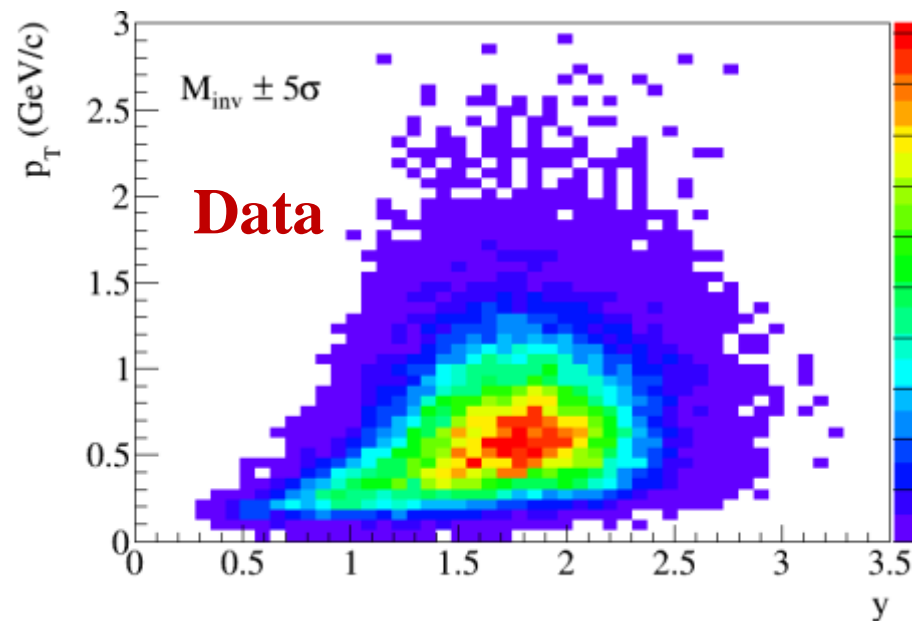


MC simulation of Λ , 50k

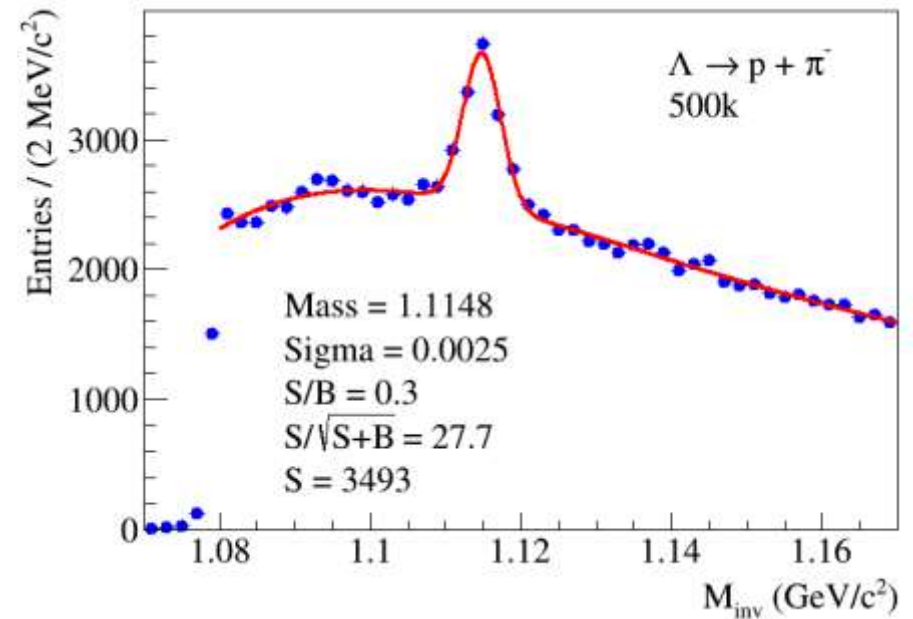
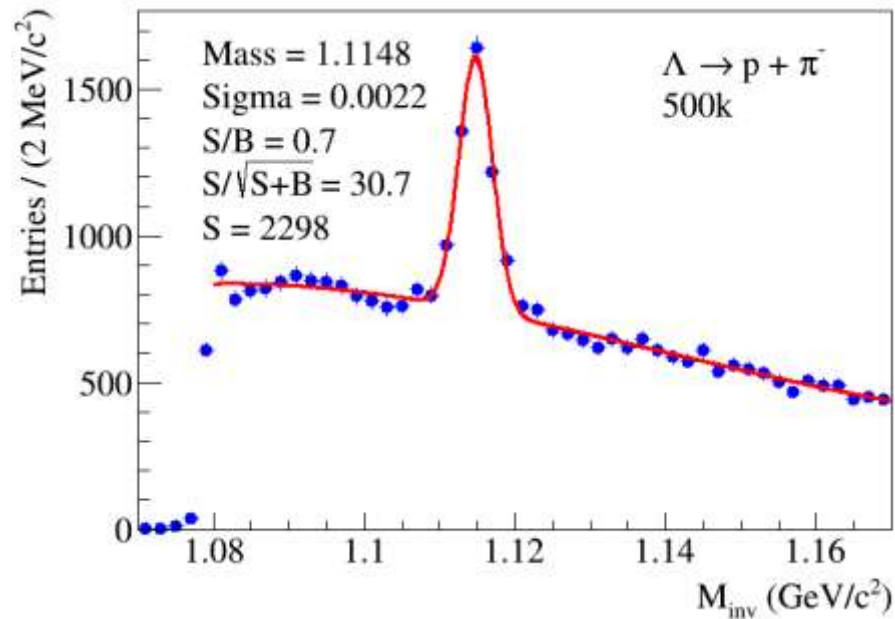


Max significance:

$10.\chi^2_{s[0]} > 6 \ \&\& \ 10.\chi^2_{s[1]} > 5 \ \&\& \ 10.\text{dsth} < 0.8$
 $\&\& \ 10.\text{path} > 3 \ \&\& \ 10.\text{angle} < 0.03$

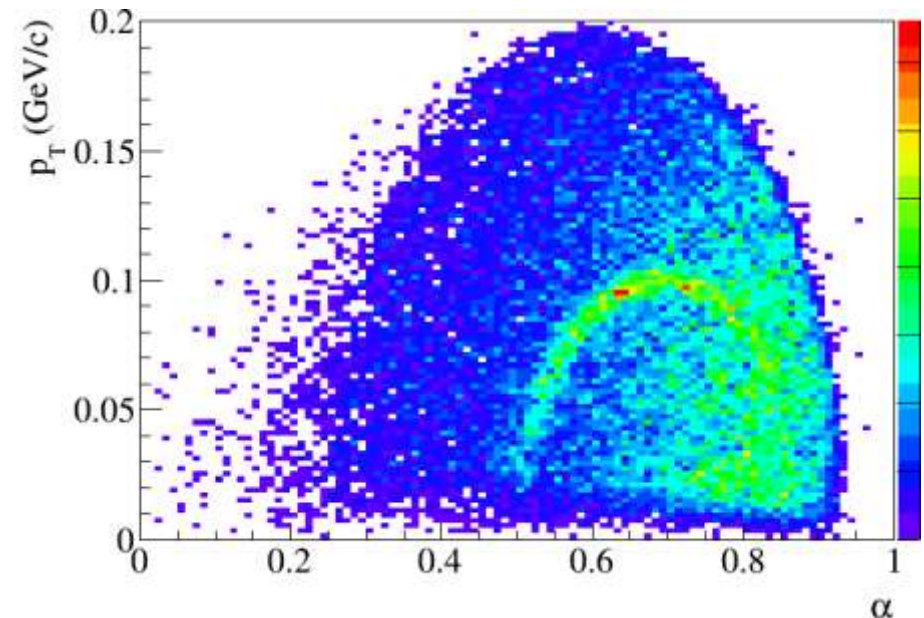


Λ reconstruction

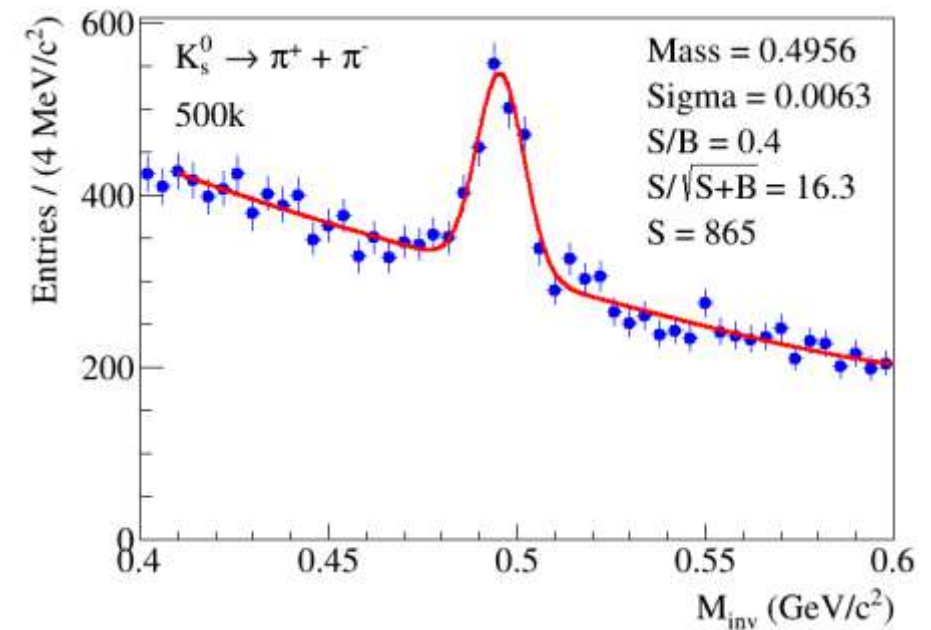
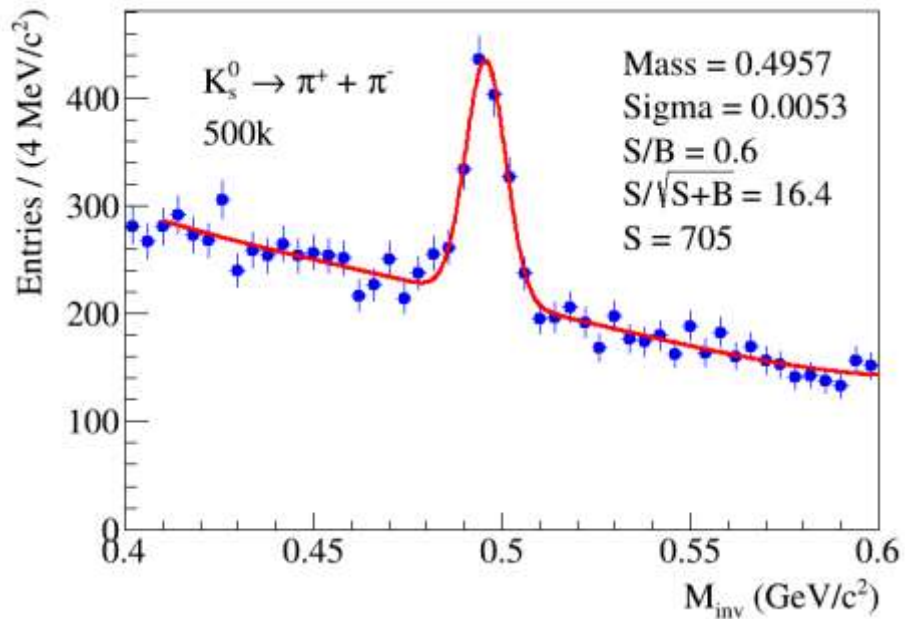


Max significance:

$10.\chi^2_{s[0]} > 2 \ \&\& \ 10.\chi^2_{s[1]} > 1.5 \ \&\& \ 10.disth < 0.8 \ \&\& \ 10.path > 4 \ \&\& \ 10.c2pv < 7 \ \&\& \ 10.angle < 0.02 \ \&\& \ 10.pts[0] > 0.05 \ \&\& \ 10.pts[1] > 0.1 \ \&\& \ 10.c2s[0] < 1.5 \ \&\& \ 10.c2s[1] < 2$

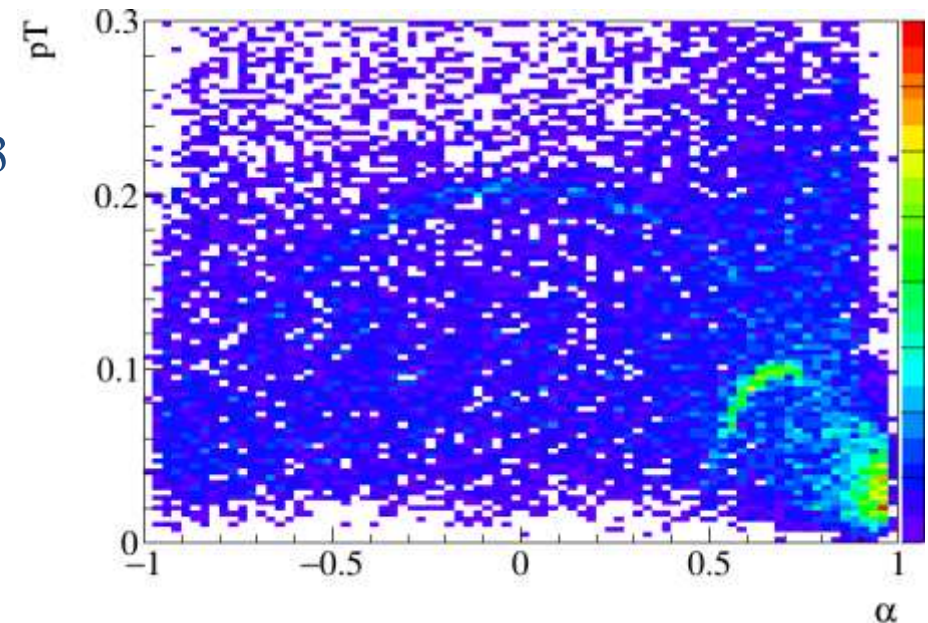


K_s^0 reconstruction



Max significance:

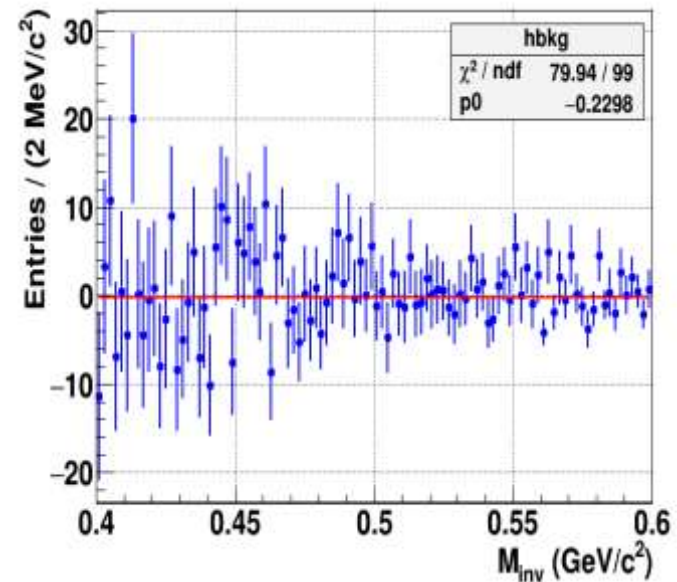
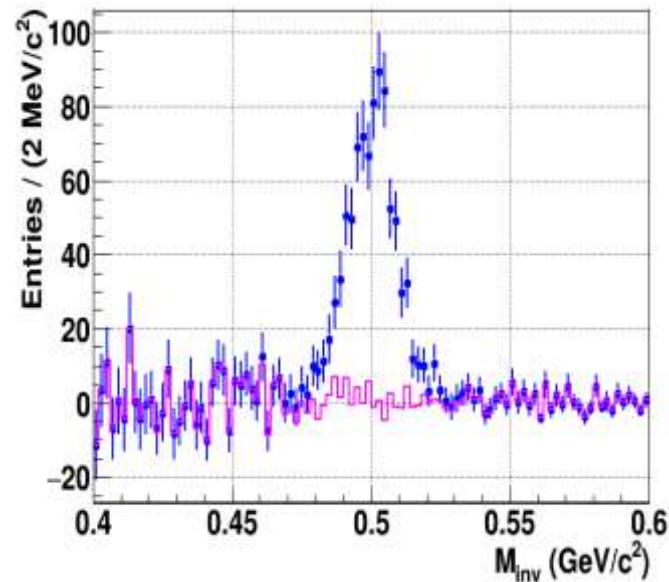
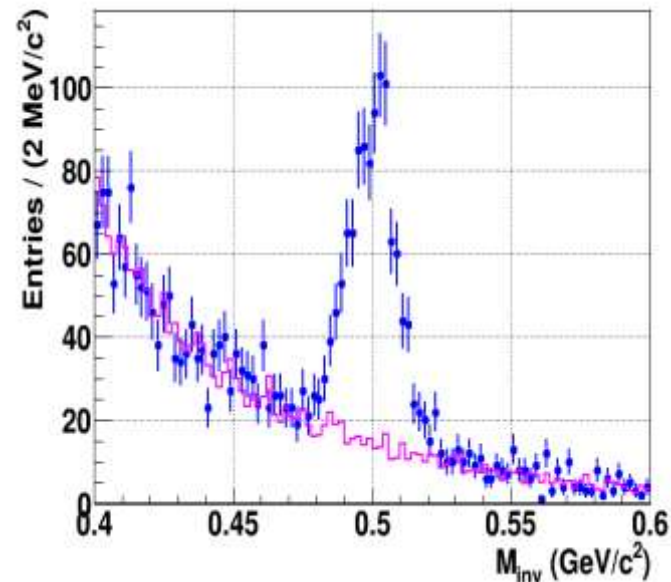
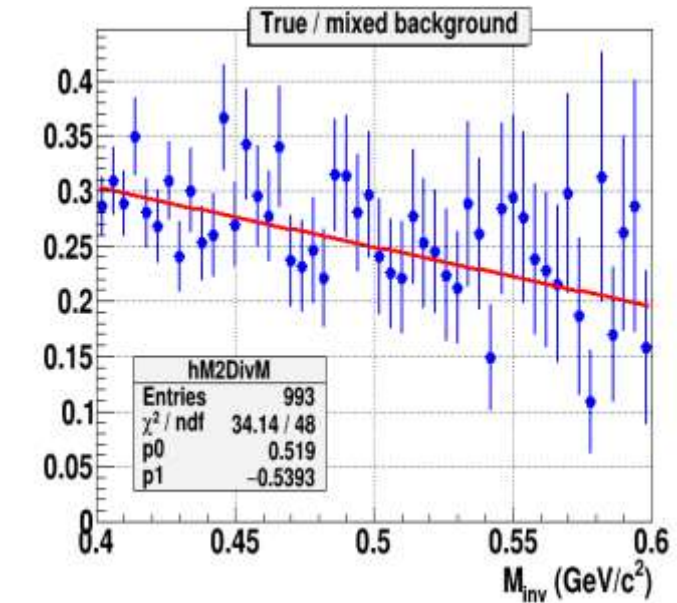
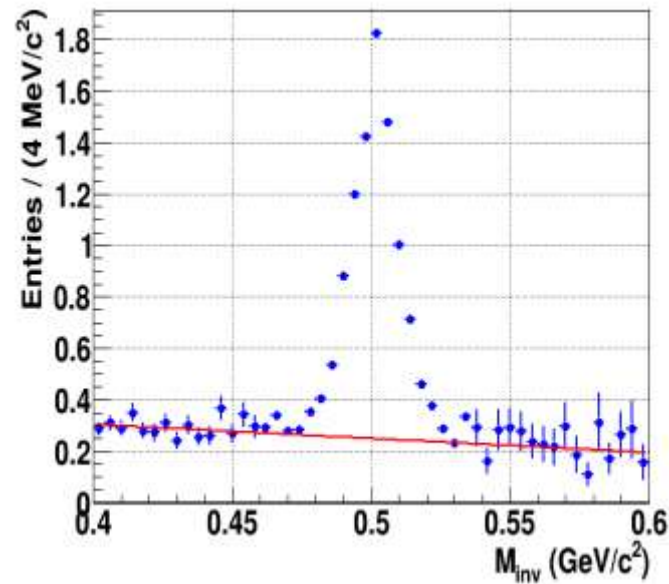
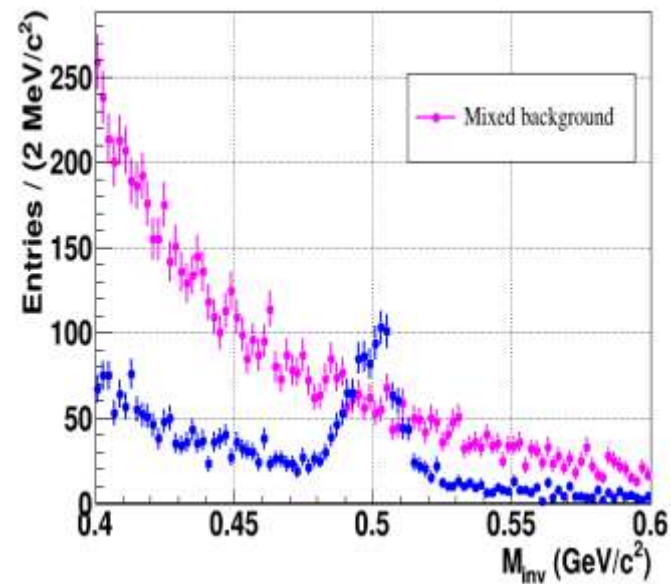
$10^{-\chi^2_{s[0]}/2} > 2$ & $10^{-\chi^2_{s[1]}/4} > 4$ & $10^{-c^2 p v} < 3$
& $10^{-\text{path}} > 4$ & $10^{-\text{angle}} < 0.03$ & $10^{-\chi^2_h} < 3$
& $10^{-c^2 s[0]} < 1.8$ & $10^{-c^2 s[1]} < 1.6$



Event mixing for background estimation



Adapted for BM@N by R.Zinchenko from MPD version by D.Suvarieva



- ✓ Vector Finder track reconstruction toolkit was optimized for BM@N setup
 - ✓ Detector alignment of ~ 150 μm in Si and ~ 500 μm in GEM was achieved
 - ✓ V0 reconstruction (Lambda and K0s) is working
 - ✓ Background subtraction procedure based on event mixing was implemented and tested on MC data
-
- ✓ Include in tracking one-dimensional (one-sided) hits
 - ✓ Possible alignment improvement
 - ✓ Add realistic effects to MC simulation (noise)