

Background studies for Drell-Yan measurements at SPD

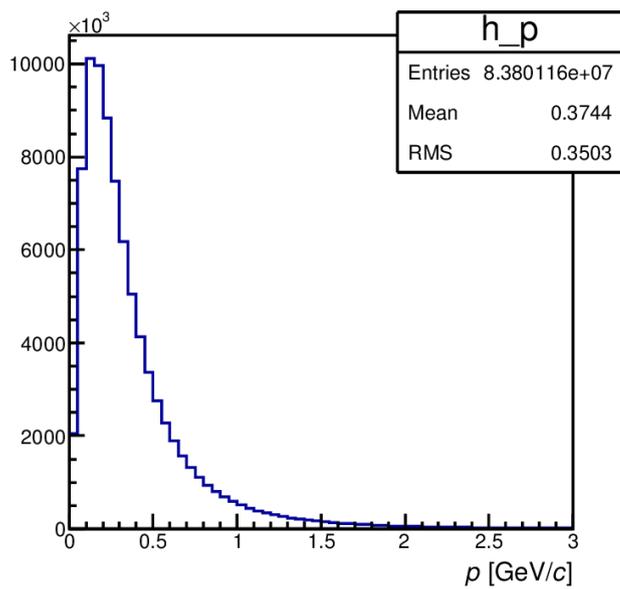
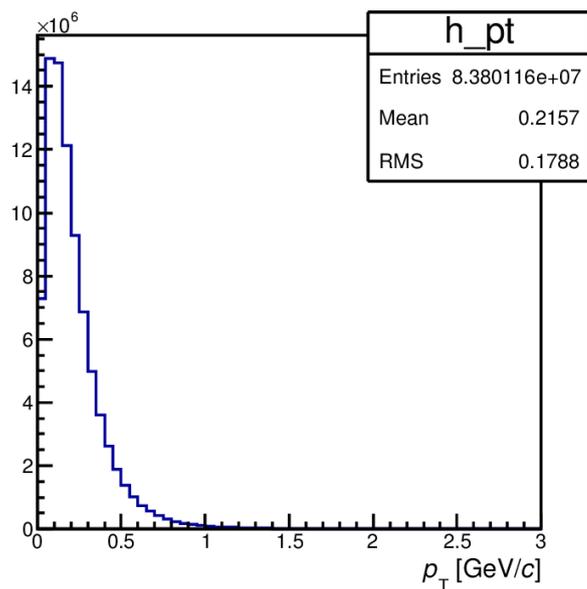
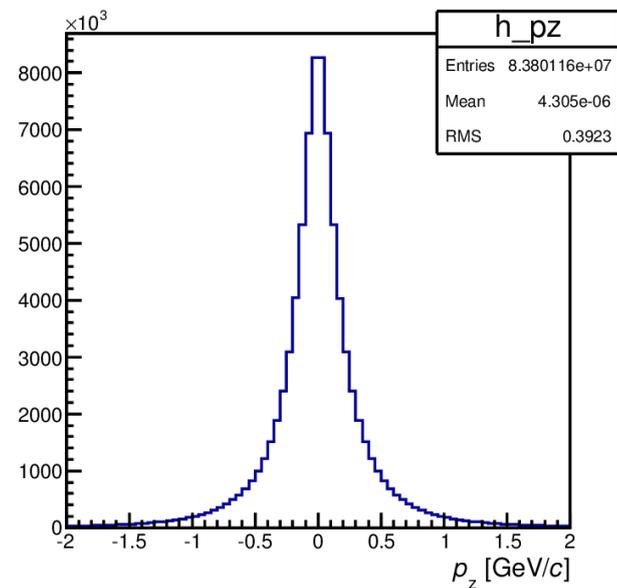
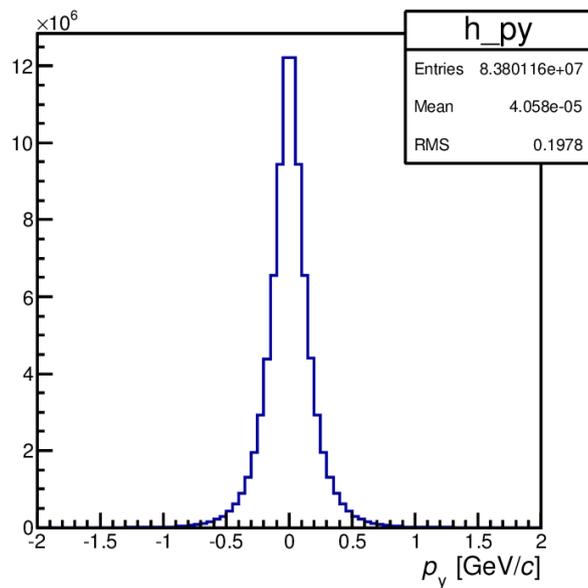
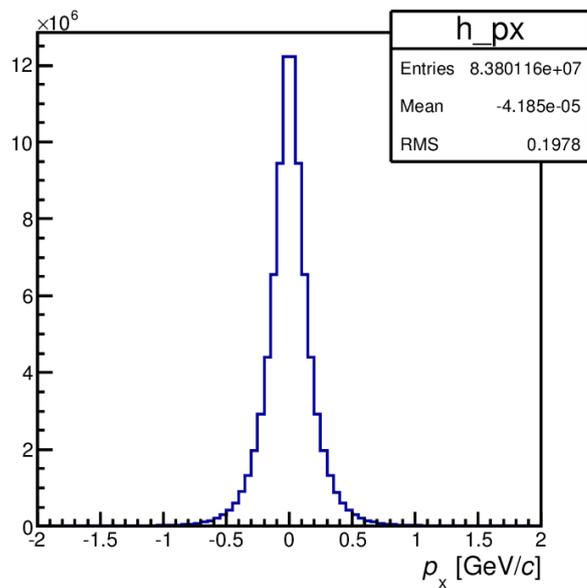
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JINR, SPD meeting
Dec 11, 2017

Generation of minimum bias events

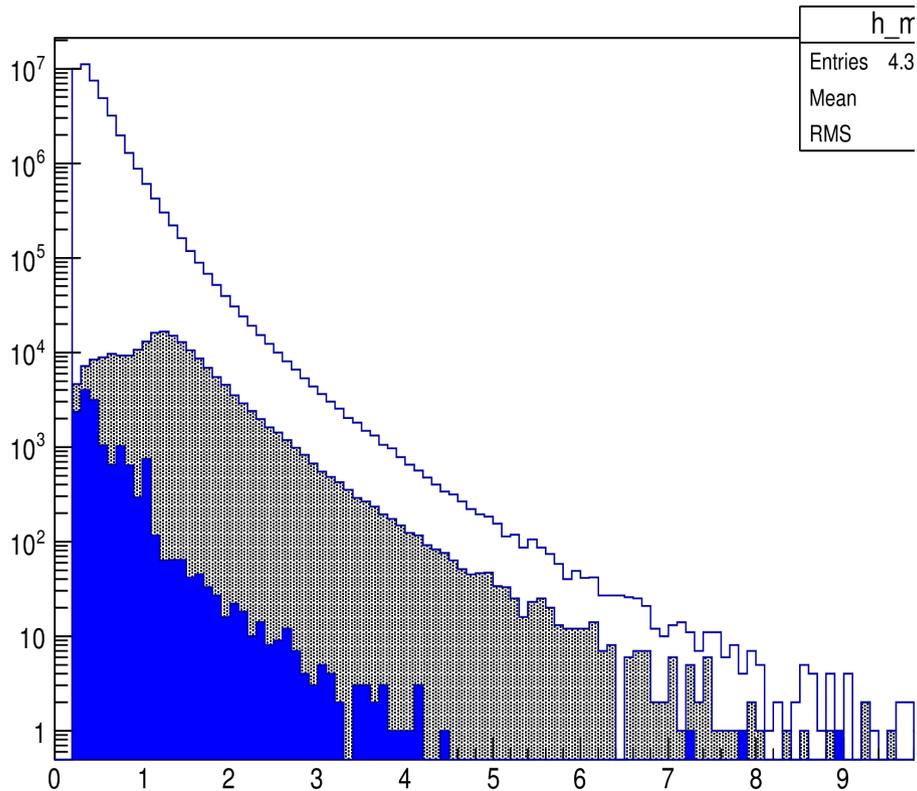
- PYTHIA 6
- MSEL=2
- 2 proton beams with $E=12$ GeV
- Decays of π^{\pm} , K^{\pm} , K_L^0 turned on
- $75 \cdot 10^6$ events
- $\sigma_{tot} = 39.4 \text{ mb}$
- Only muons produced in volume with $L=8$ m and $D=7$ m were taken into account.

Momenta distributions

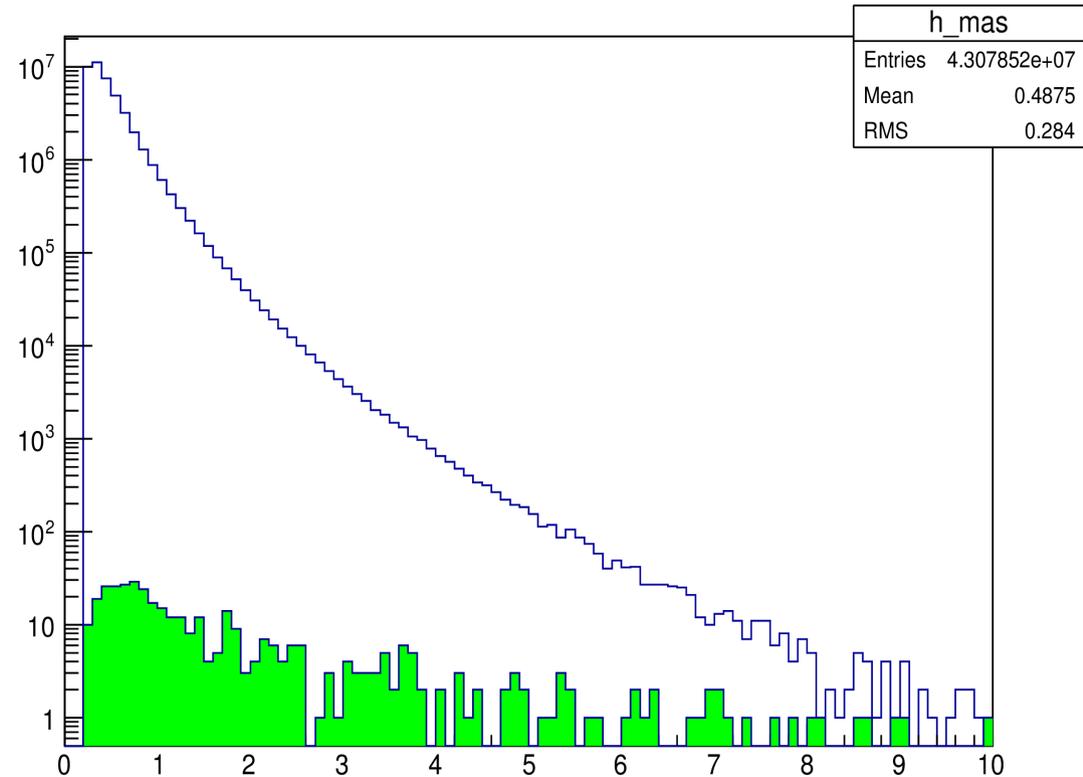


Dimuon mass distribution

dimuon mass



dimuon mass



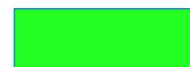
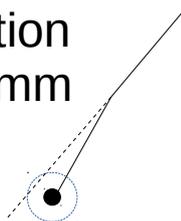
no cuts



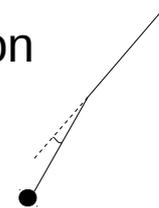
$p_T > 0.5 \text{ GeV}$



muon track prolongation
crosses area of $d=1 \text{ mm}$
around z axis



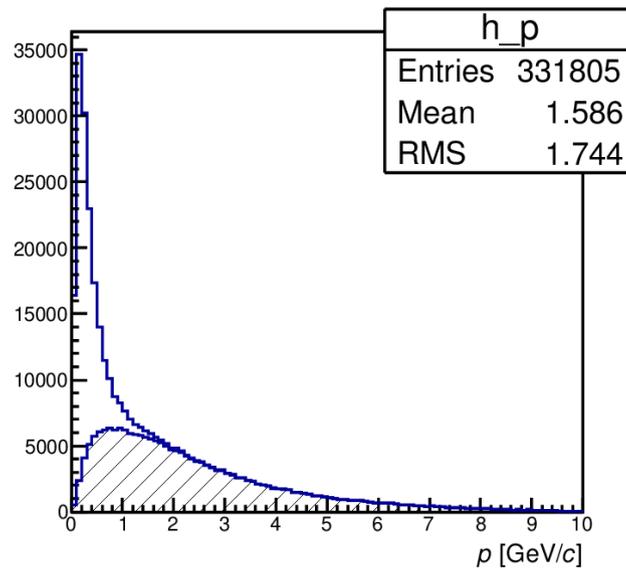
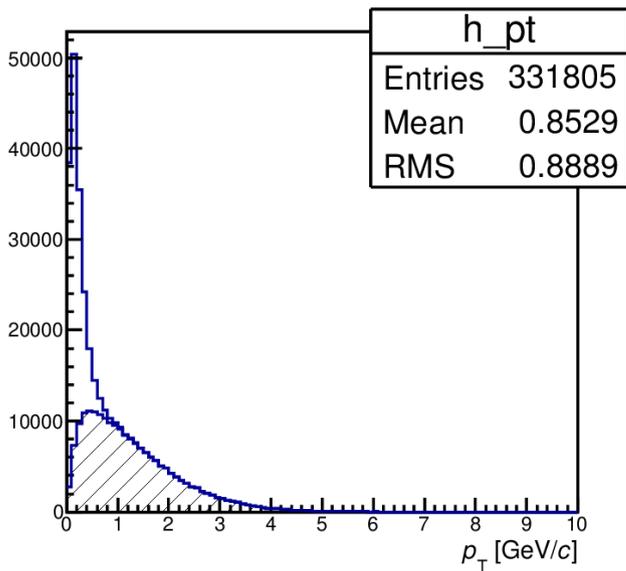
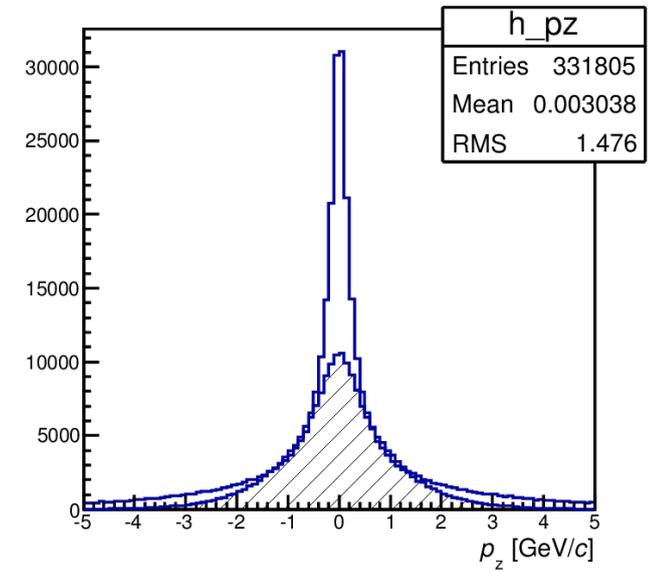
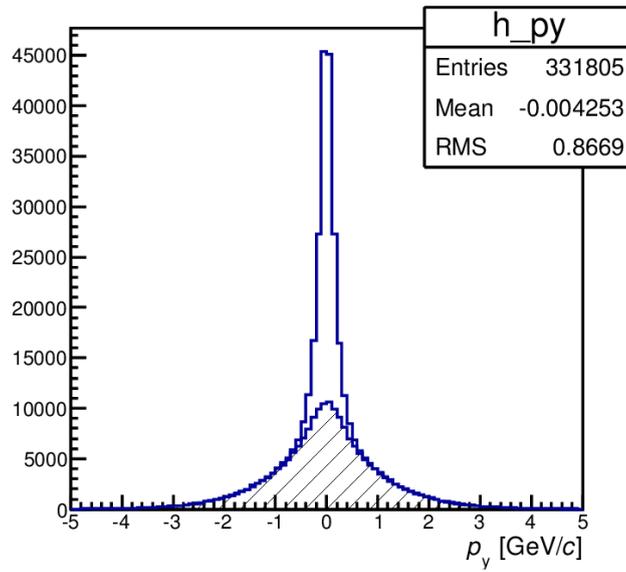
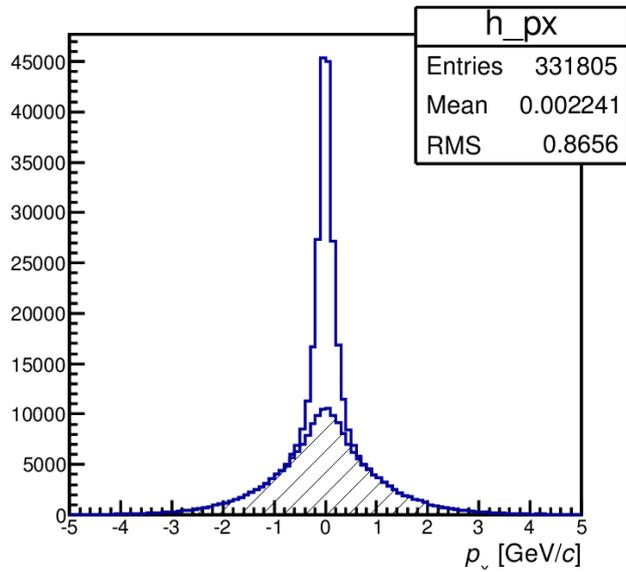
angle between hadron
and muon tracks
 $< 0.01 \text{ rad}$



Generation of DY events

- PYTHIA 6
- 2 proton beams with $E=12$ GeV
- Only process $q\bar{q}\rightarrow\gamma^*\rightarrow\mu^+\mu^-$
- $m_{\mu\mu} > 1$ GeV
- Decays of π^\pm , K^\pm , K_L^0 turned on
- 10^5 events
- $\sigma_{tot} = 8.7$ nb (ratio $\sigma_{tot}(MB)/\sigma_{tot}(DY) \approx 4.5 \cdot 10^6$)
- Only muons produced in volume with $L=8$ m and $D=7$ m were taken into account.
- (For $m_{\mu\mu} > 3$ GeV $\sigma_{tot} = 0.23$ nb)

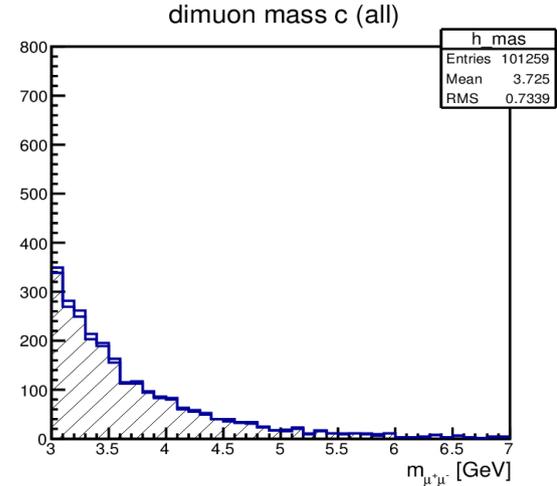
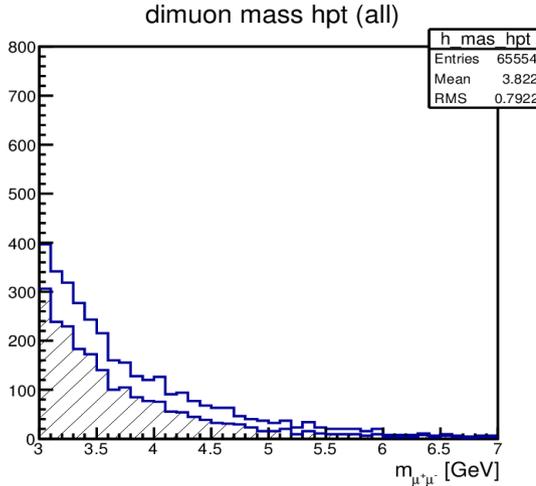
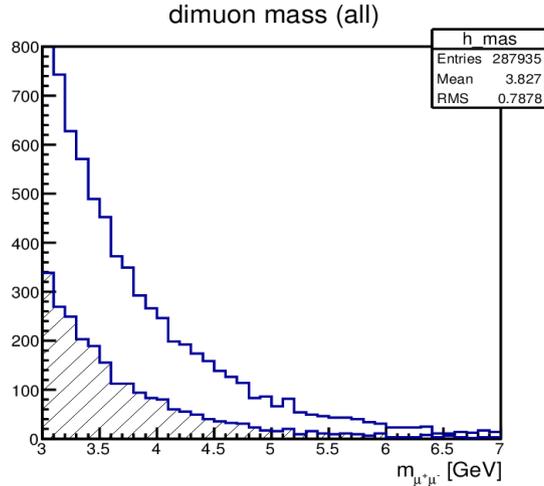
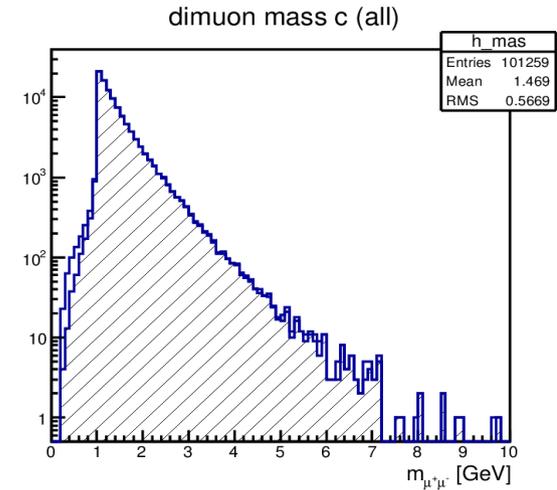
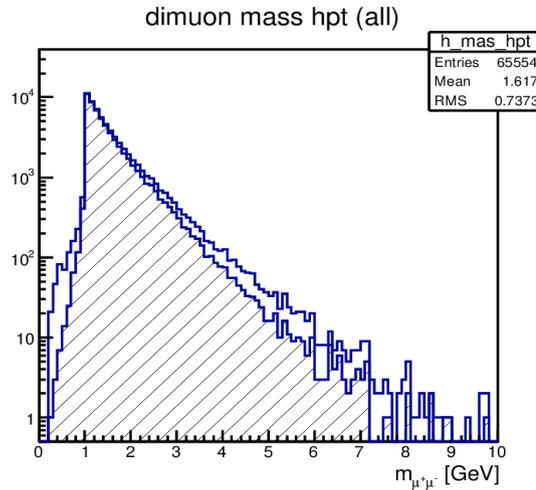
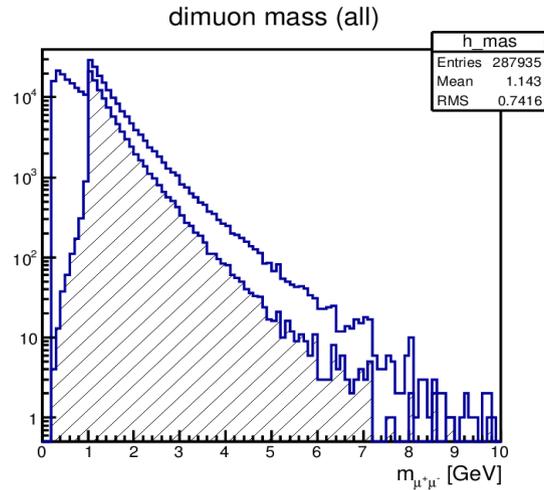
Momenta distributions



 all muons

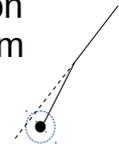
 proper DY muons

Dimuon mass comparison

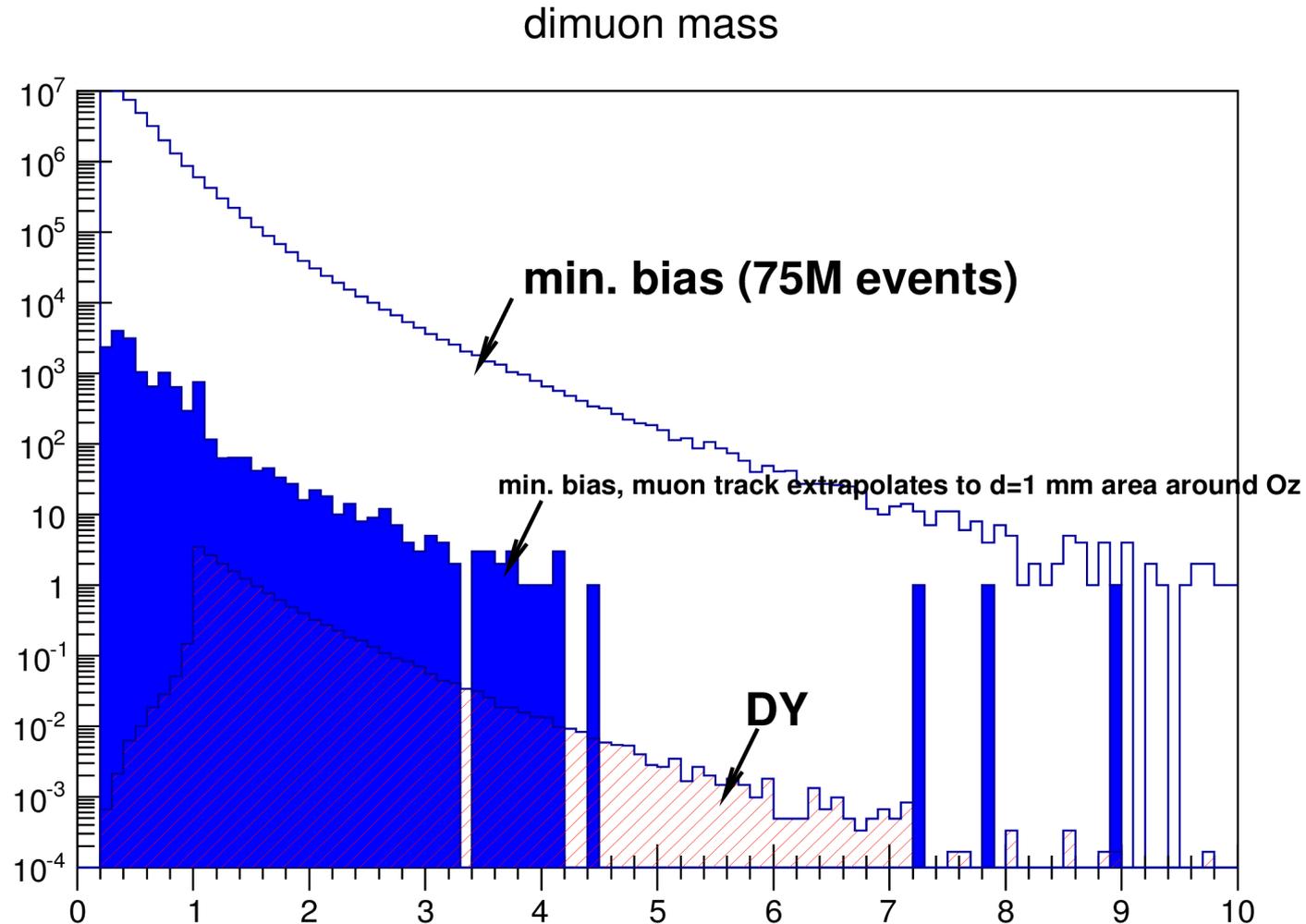


$p_T > 0.5 \text{ GeV}$

muon track prolongation
crosses area of $d=1 \text{ mm}$
around z axis



MB and DY comparison



Integral ratio of number of DY / background dimuon pairs:

- m in $[3 .. 4.5 \text{ GeV}]$: $\sim 1 / 80$
- $m > 4.5 \text{ GeV}$: $\sim 1 / 60$

Conclusion

- Background studies for DY are in progress
- Main source of background is decays of pions and kaons
- Tracking coordinate system with high acceptance and high precision is needed.
- Alternative setup configuration — for example, with hadron absorber — is to be considered.