Smuon Pair MC/Rec. Comparison with CEPCSW 25.3.6 at CEPC@240GeV

LYU Feng, LIANG Shiyi, ZHUANG Xuai, WU Minlin

24th/March/2025

Basic Information

- **CEPC@240GeV smuon pair samples under CEPCSW 25.3.6 are produced by LIANG Shiyi:**

/lustrefs/atlas/SUSY/users/liangsy/CEPC/cepcsampleproduction/smuonRec/Reco/HADD/rec*.root, which has 73 mass points: (Msmu, MLSP), **5K events** per mass point

Msmu: 80, 90, 100, 115, 118 GeV

MLSP : 1, 10, 20, …. , Msmu-10, Msmu-5, Msmu-2 GeV

- **Analysis code modified from KAI li's tutorial:**

https://code.ihep.ac.cn/zhangkl/cepcsw_tutorial/-/tree/master/analysis?ref_type=heads

- **Preselection:** Two energetic tracks >0.5GeV, **NoPID**,
  OS, Rec. /Truth match: $\Delta R<0.1$

- **Variables:**

  Eμ: the muon energy

  Mμμ: the muon pair invariant mass

  pT: the muon pair system total transverse momentum

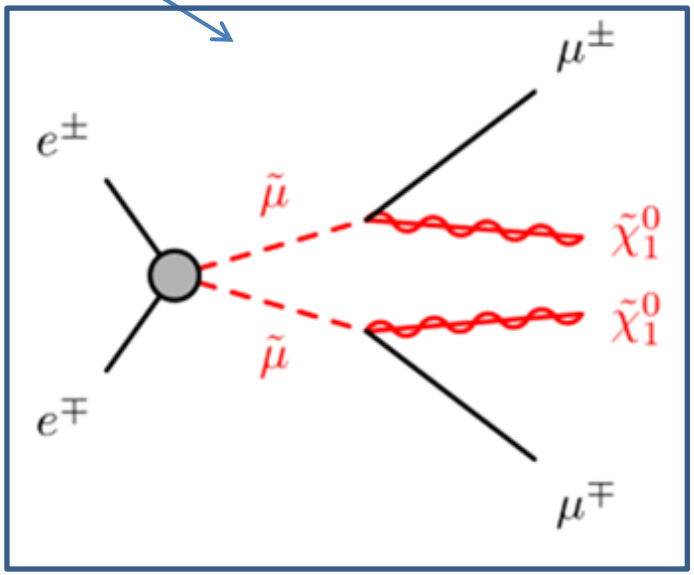
  M_{recoi}: the muon pair system recoil mass

  ΔR(μ, recoil): between μ and μμ system recoil vector

  Δϕ(μ, recoil): between μ and μμ system recoil vector

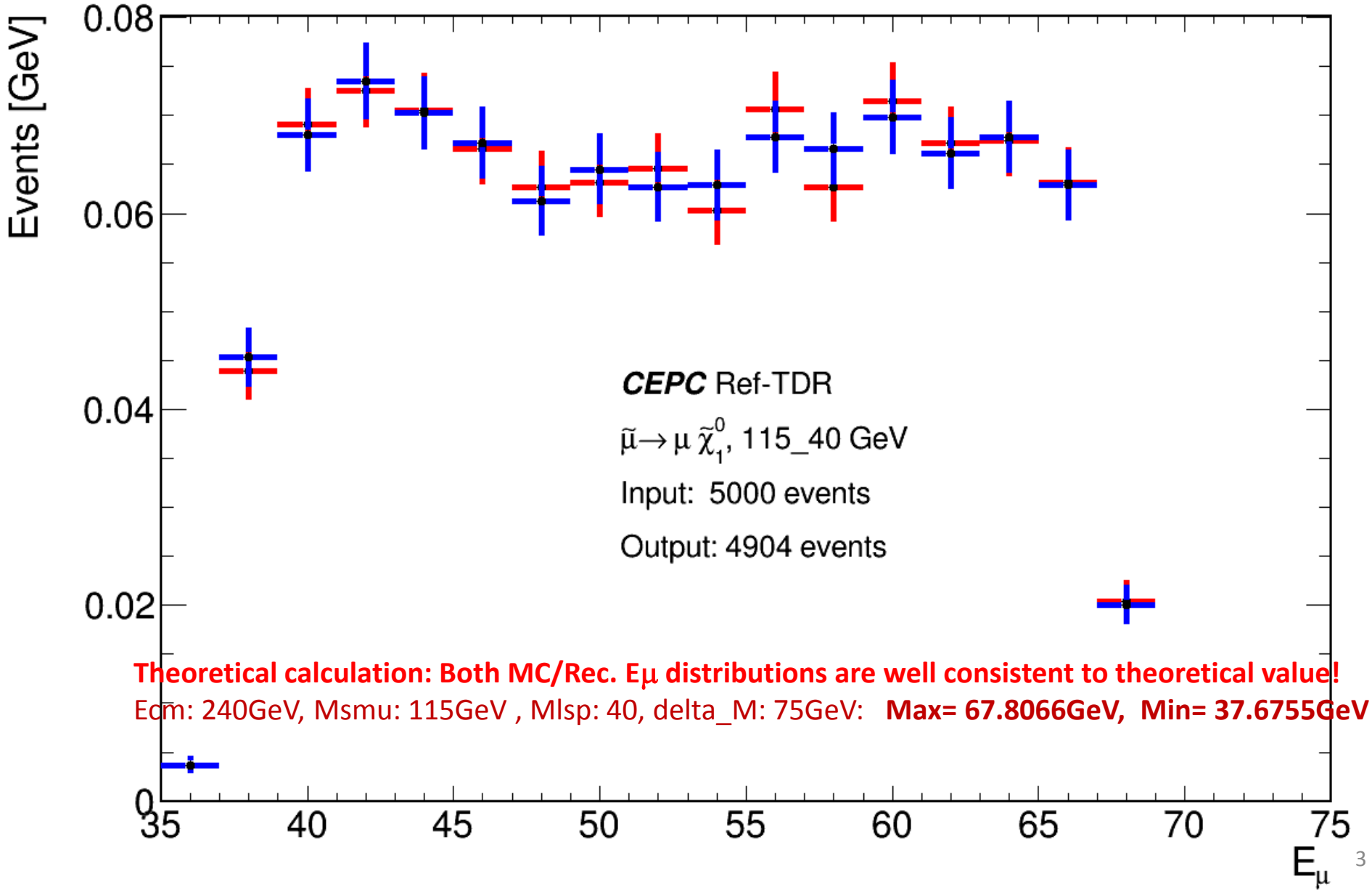
  ΔR(μ1, μ2): between μ tracks

  Δϕ(μ1, μ2): between μ tracks



- **Reference mass point:** (115,40) GeV

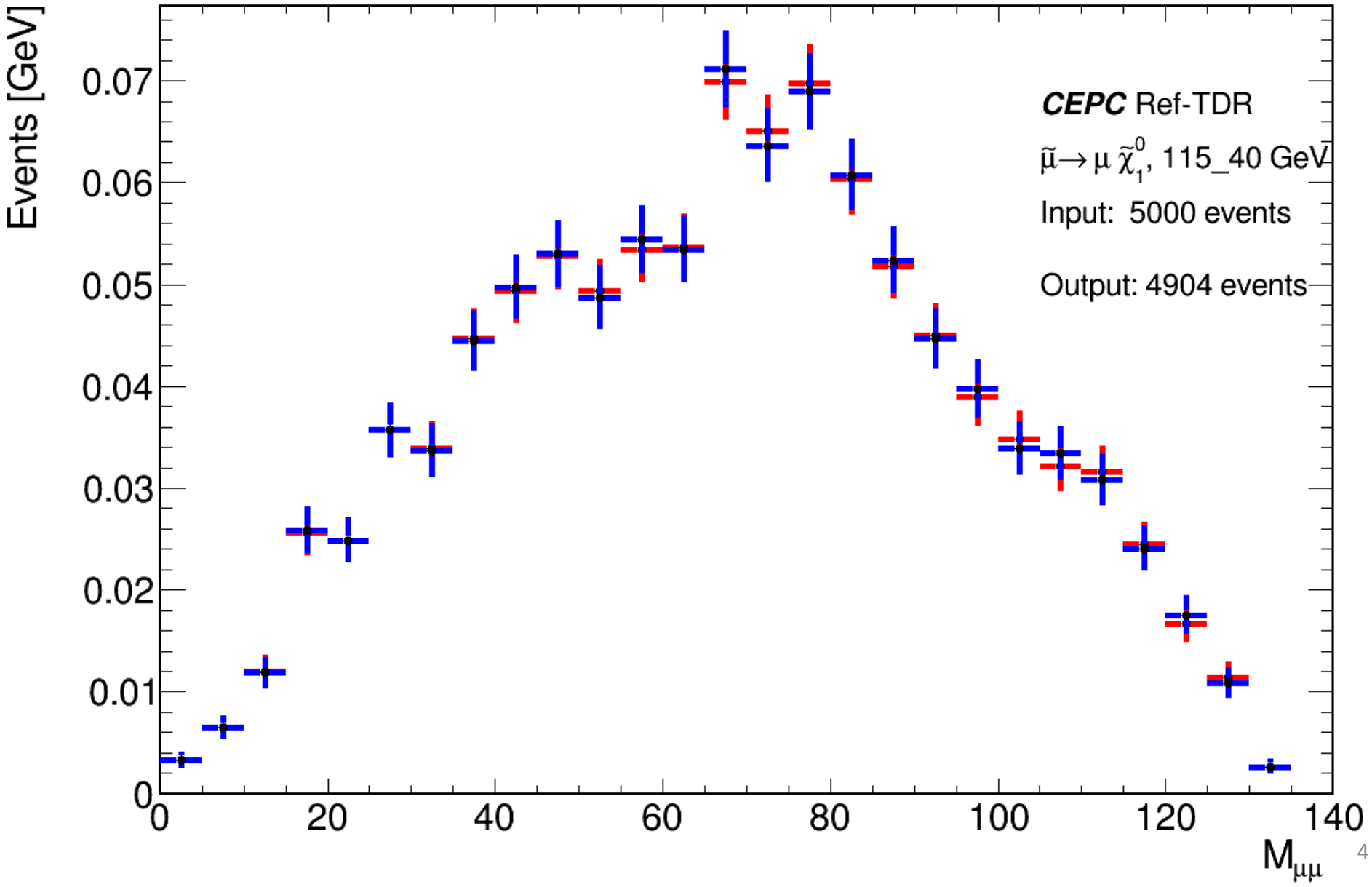
Red: Rec. Blue: Truth well consistent !



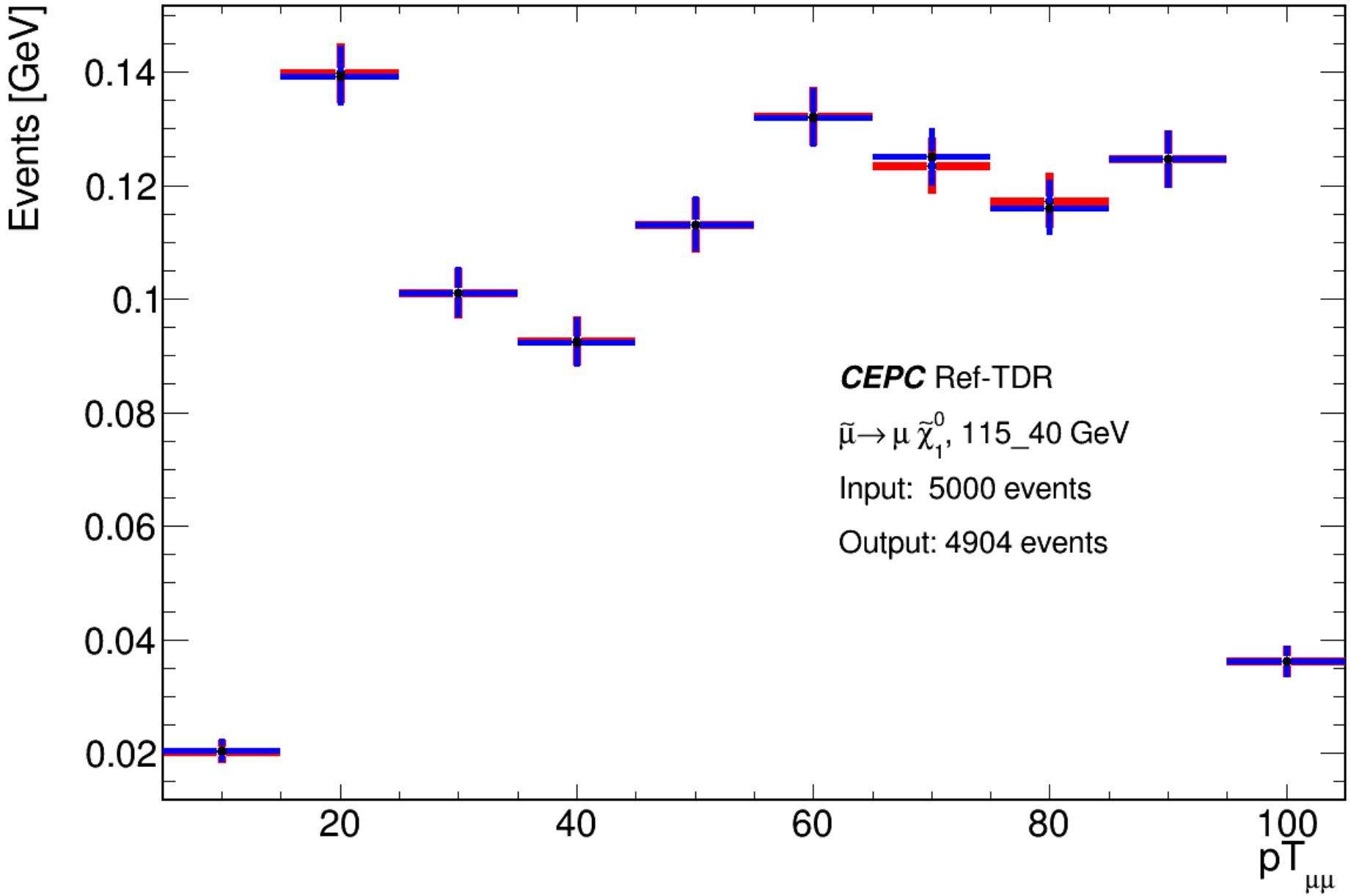
Theoretical calculation: Both MC/Rec. Eμ distributions are well consistent to theoretical value!

Ecm: 240GeV, Msmu: 115GeV , Mlsp: 40, delta_M: 75GeV: **Max= 67.8066GeV, Min= 37.6755GeV**

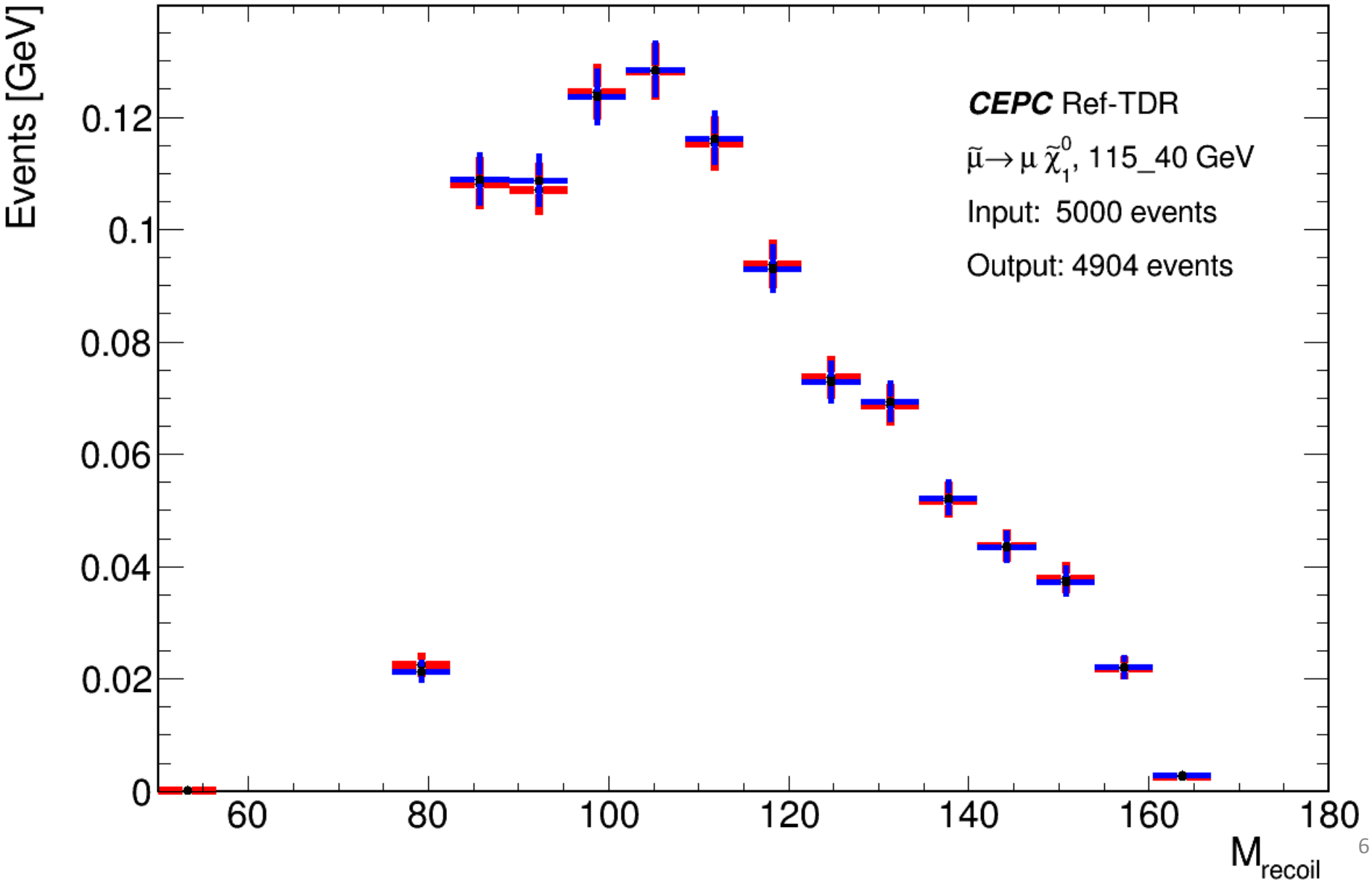
Red: Rec. Blue: Truth well consistent !



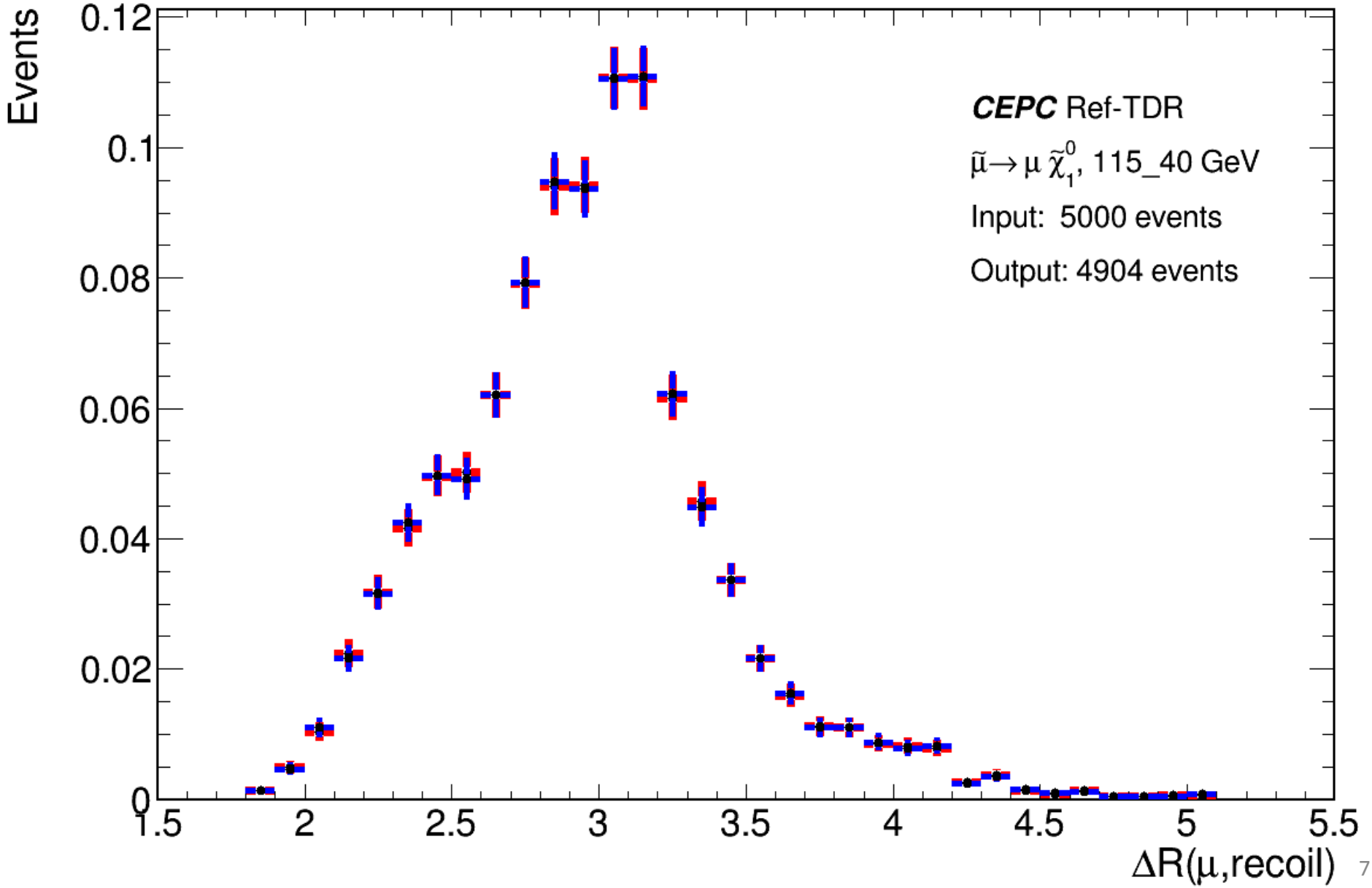
Red: Rec. Blue: Truth well consistent !



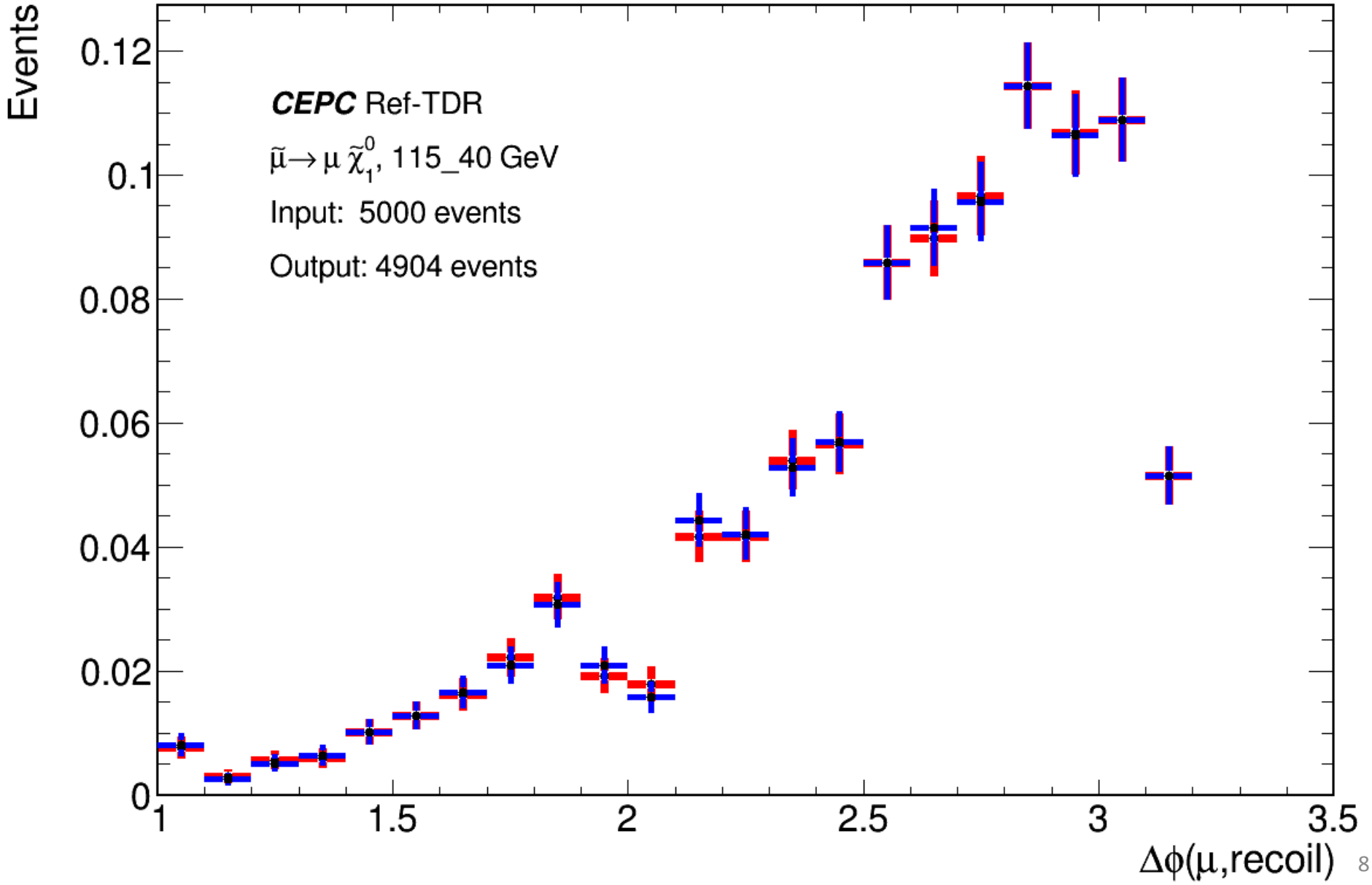
Red: Rec. Blue: Truth well consistent !



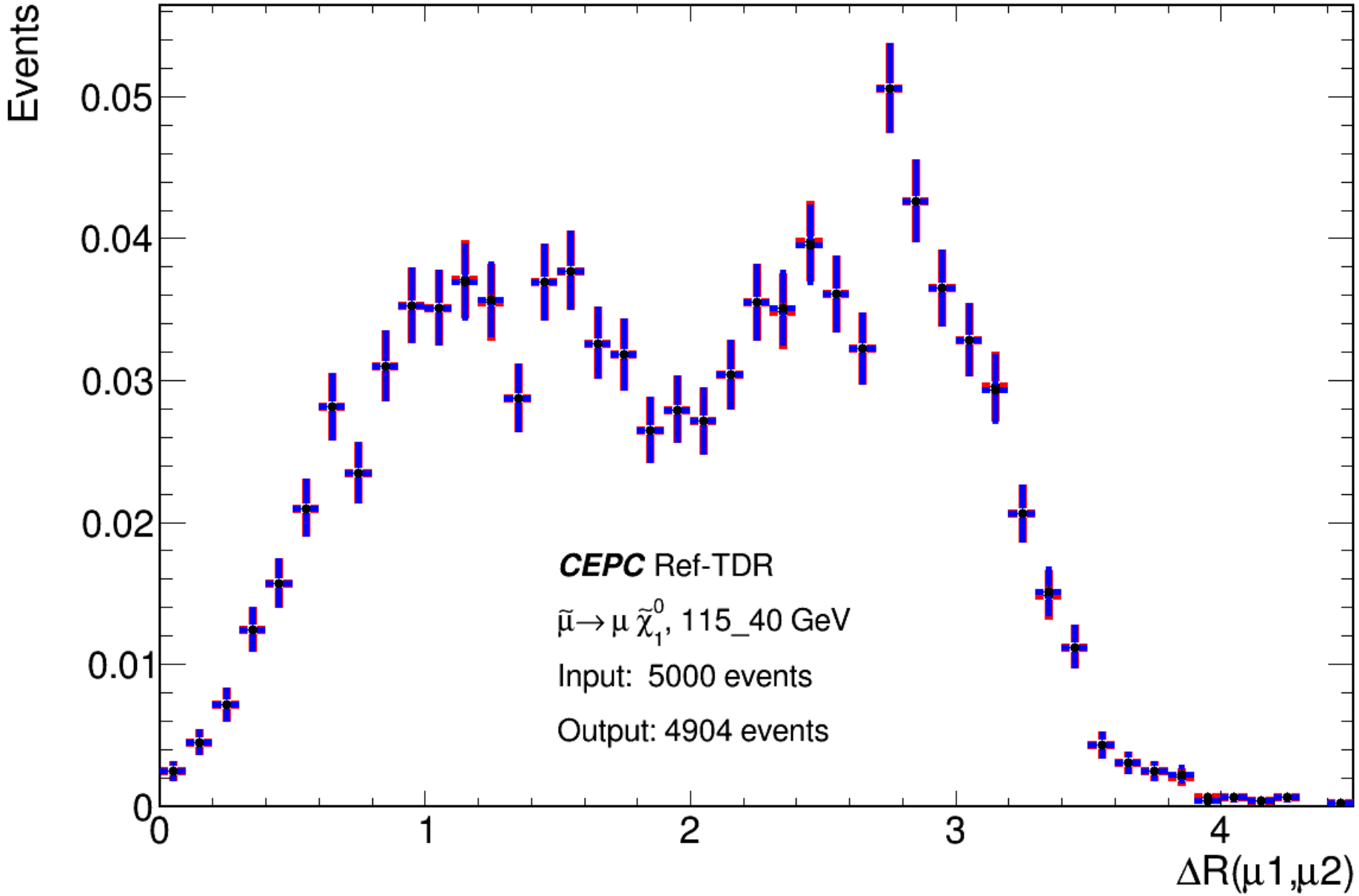
Red: Rec. Blue: Truth well consistent !



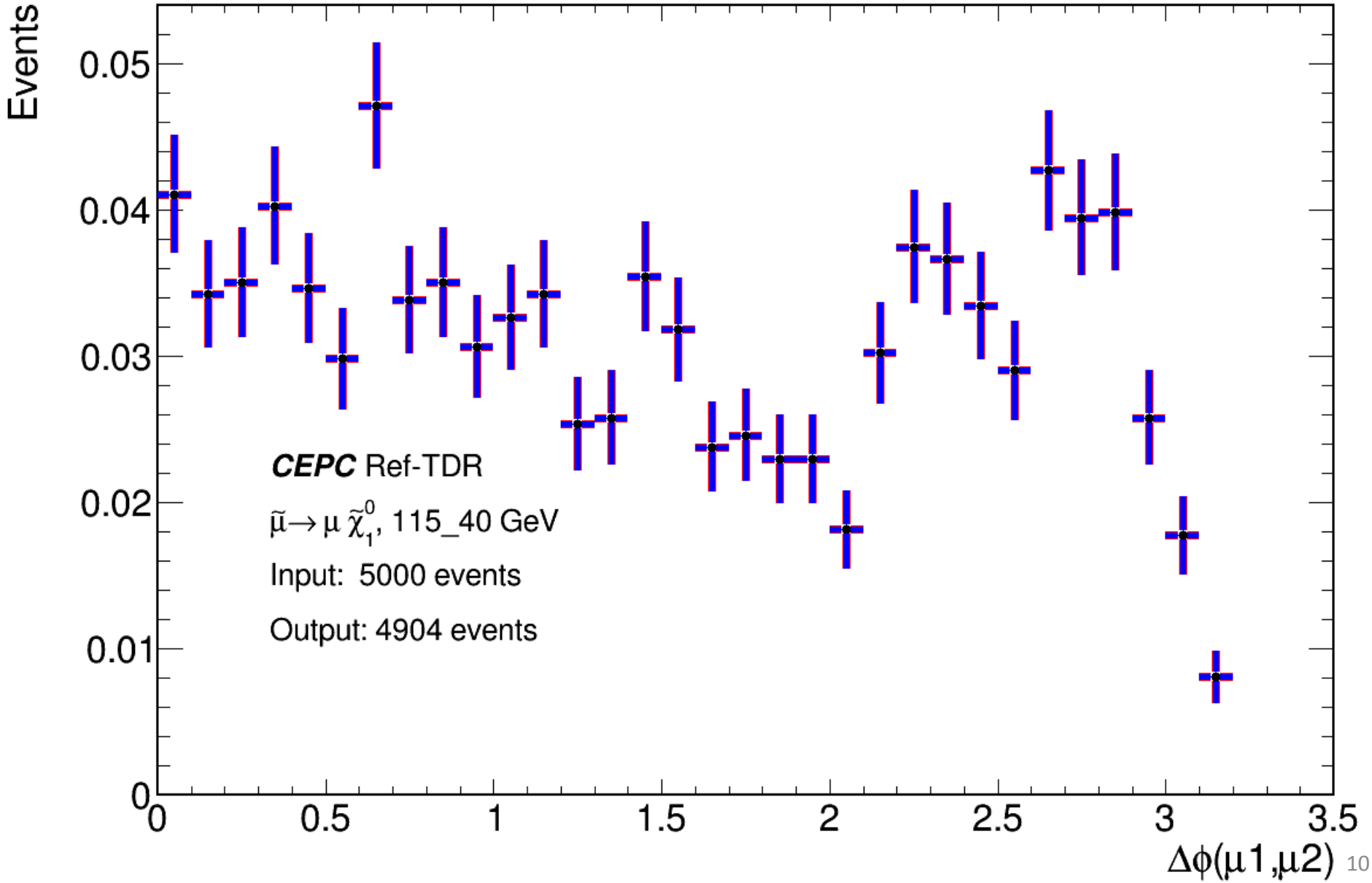
Red: Rec. Blue: Truth well consistent !



Red: Rec. Blue: Truth well consistent !



Red: Rec. Blue: Truth well consistent !



Conclusion

Rec./Truth performances comparison is well consistent by CEPC@240GeV smuon pair mass point (115, 40GeV) μ-channel check under CEPCSW 25.3.6