Solenoid vs toroid: for different type of particles

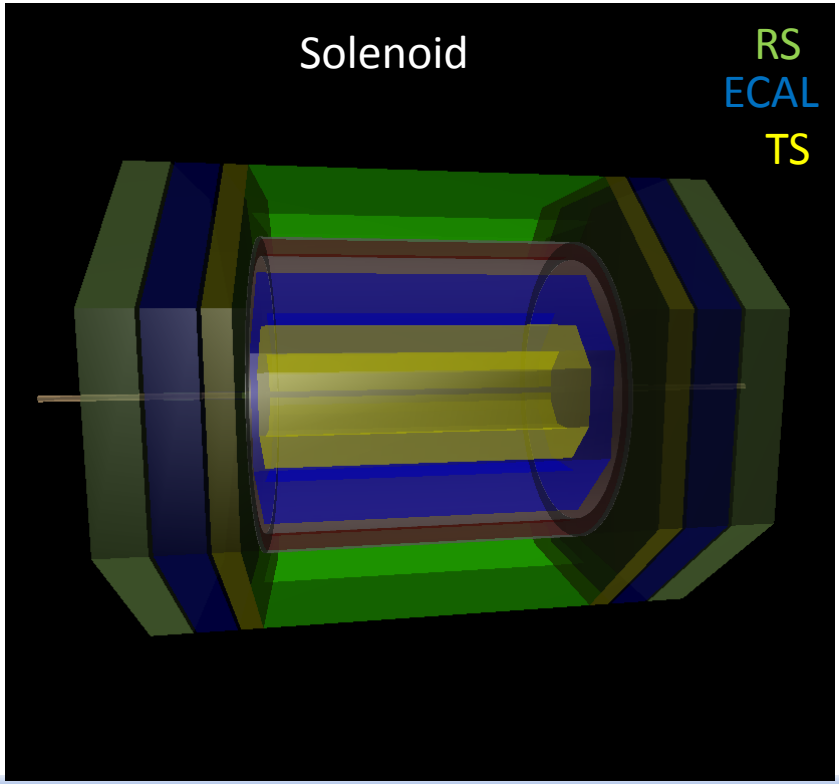
SPD meeting

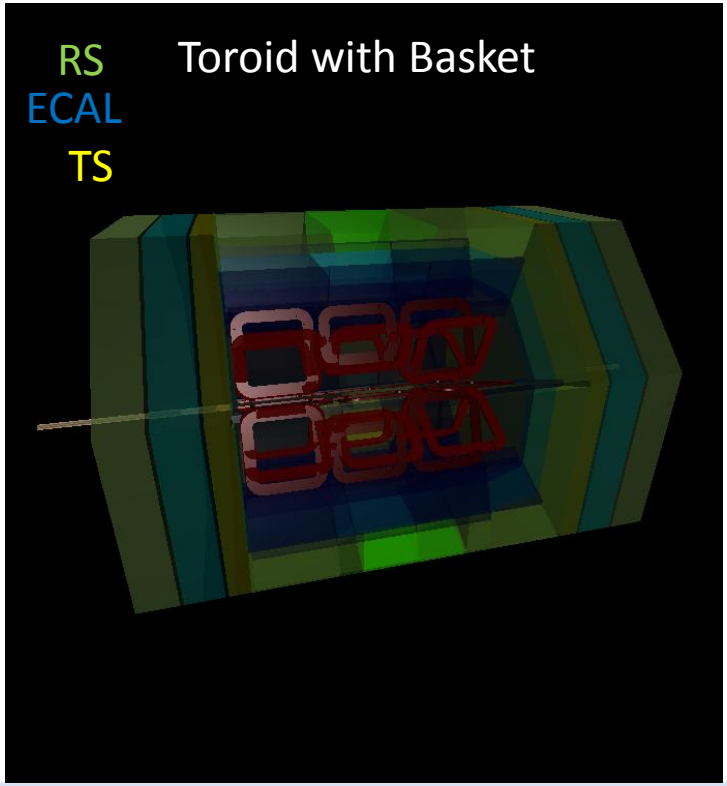
21 May 2018

Settings

- *Tools:* SpdRoot + Pythia 6 - https://git.jinr.ru/Tkachenko/spdroot

- *Data:* Solenoidal and Toroidal SPD set-up with 100 000 events
  - Minimum bias
  - J/ψ
  - Drell-Yan





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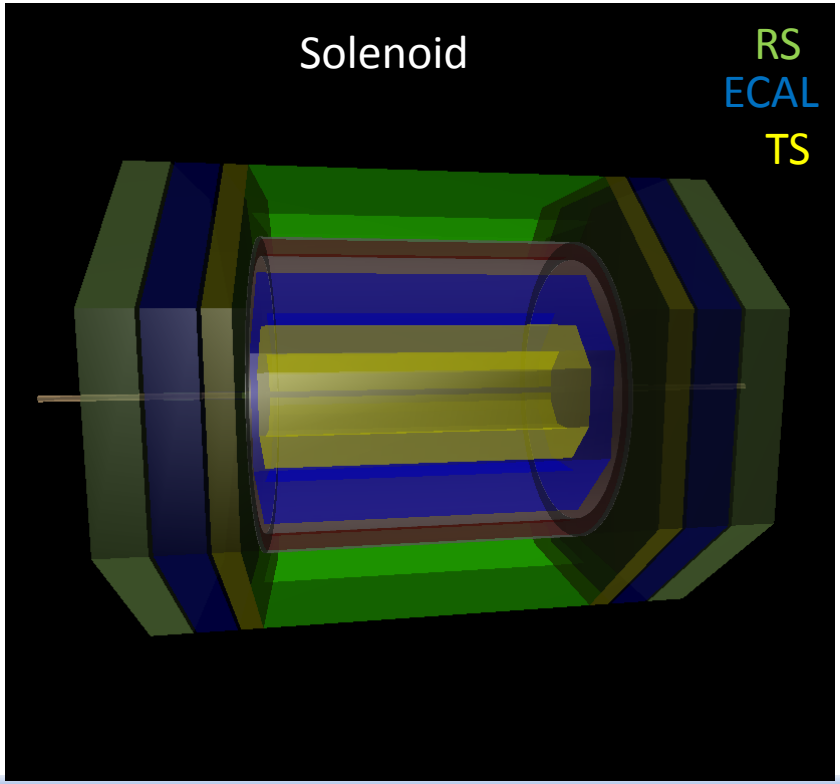
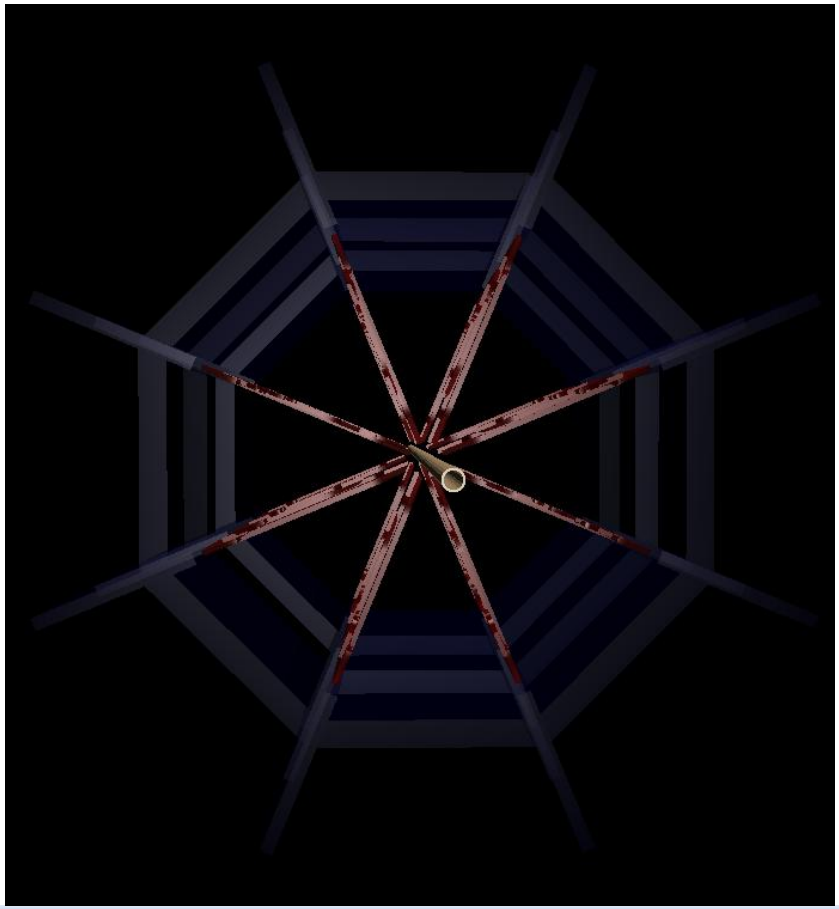


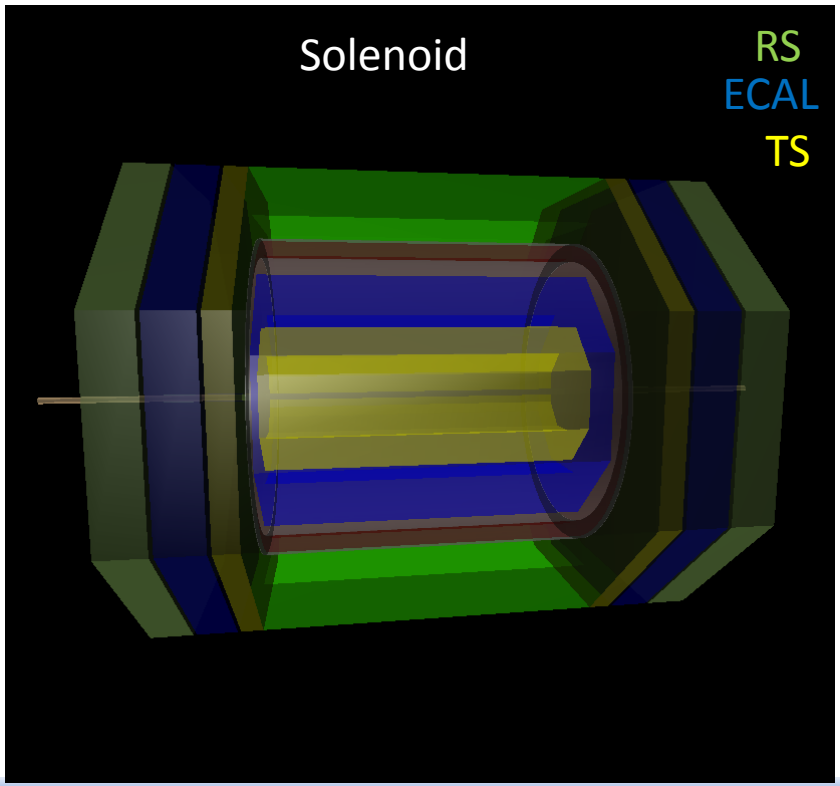


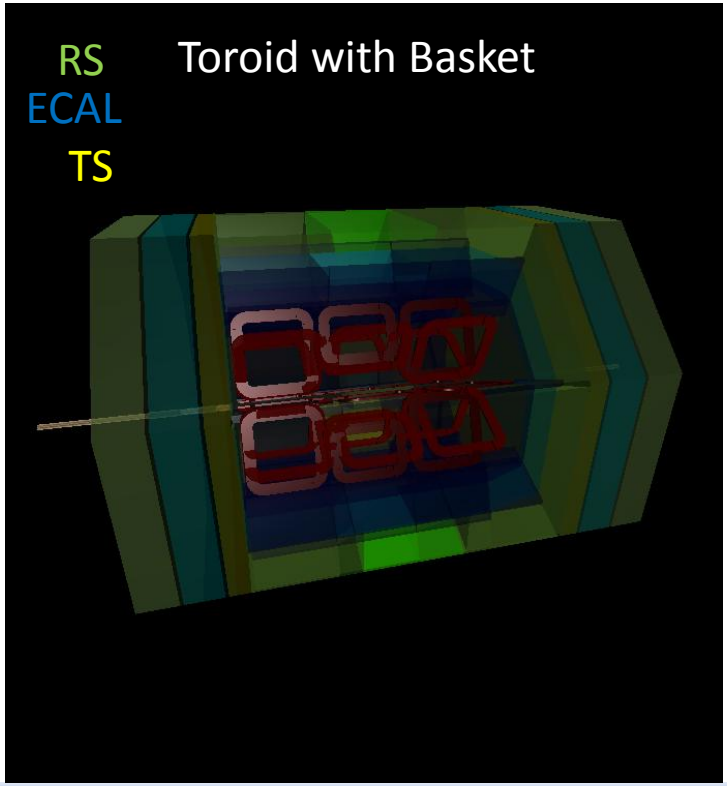
To Study

- μ^+/μ^-
- γ, π^0
- $K^{\pm}$
- $\pi^{\pm}$

- Drell-Yan
  - $\mu^+\mu^-$
- J/ψ
  - $\mu^+\mu^-$

- Σ^+: $p\pi^0$ - *51.57±0.30 %*
- Λ : $p\pi^-$ - *63.9 ±0.5 %*
- K^0: $\pi^-\pi^+$ - *69.20±0.05 %*



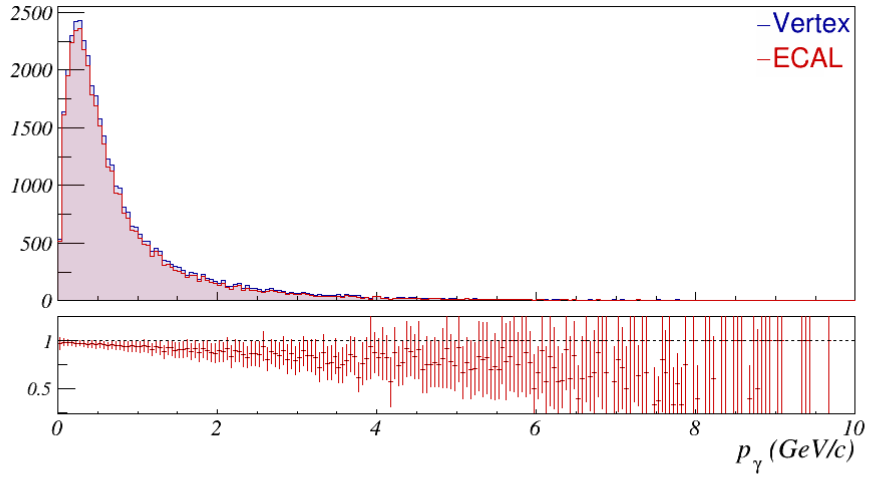


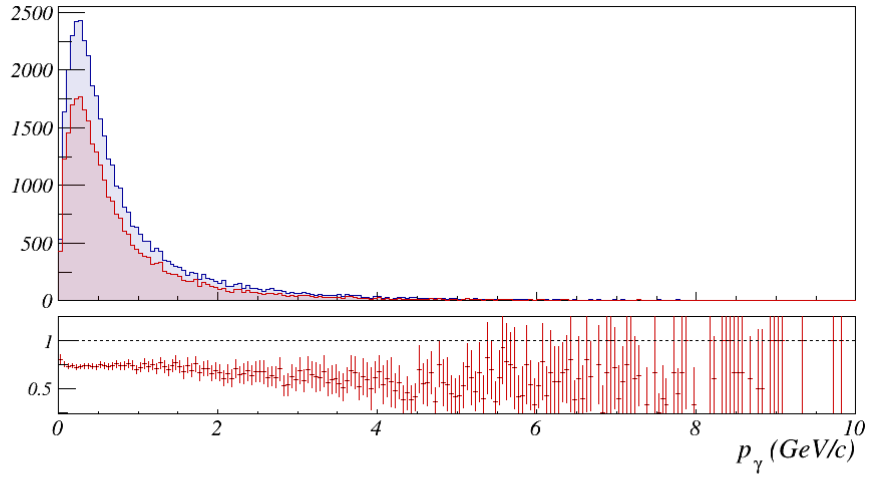
Solenoid vs toroid: γ

Solenoid

Toroid

p





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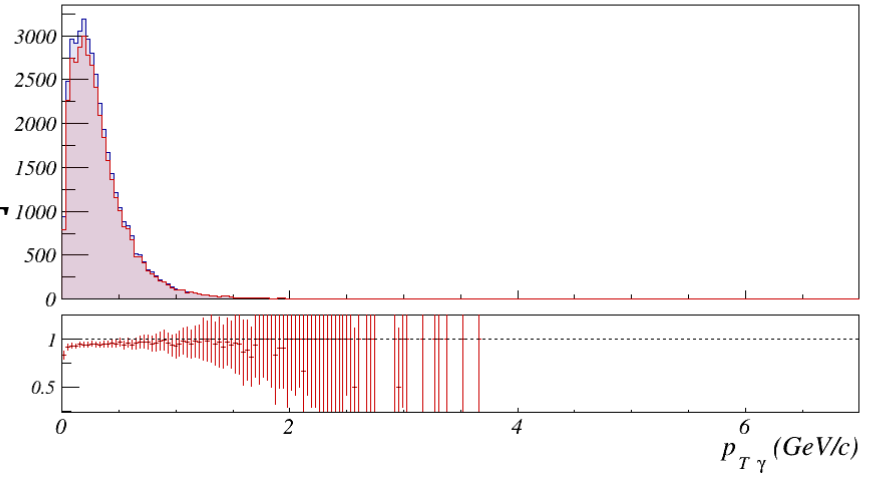
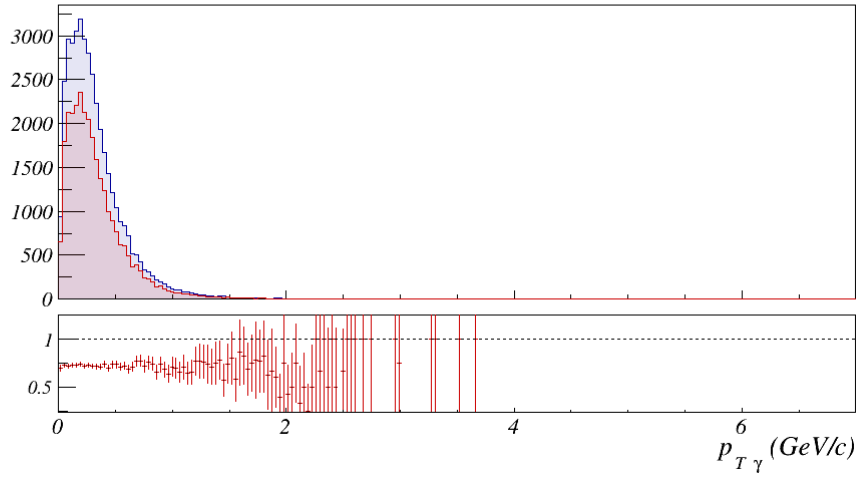




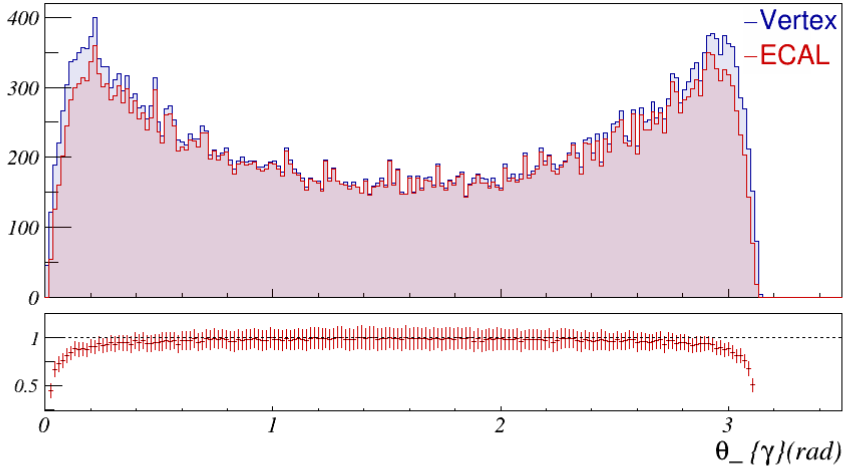
Detector	Solenoid %	Toroid %
ECAL	94.3	73.1

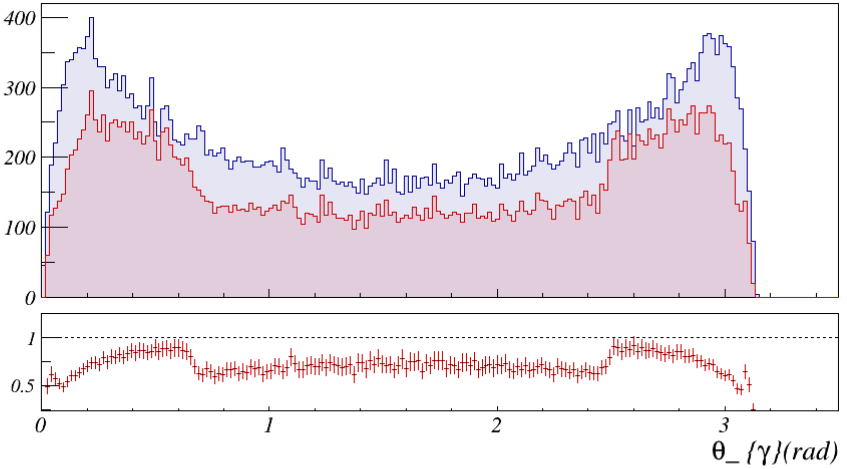
Solenoid vs toroid: γ

Solenoid

Toroid

θ





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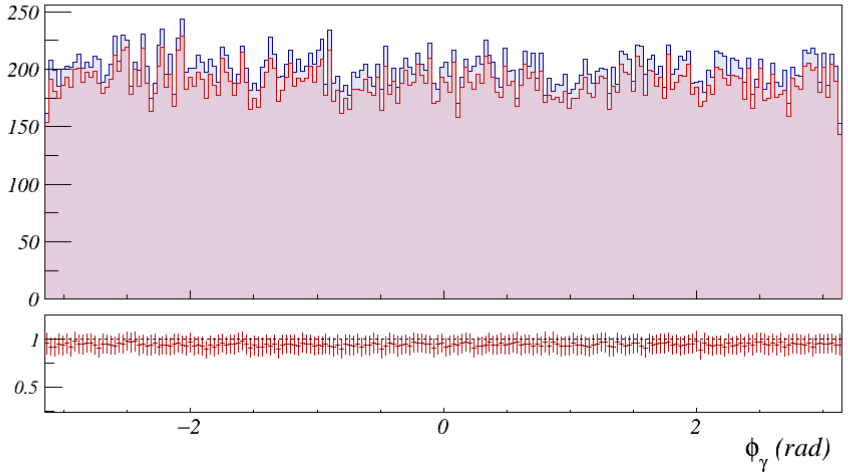
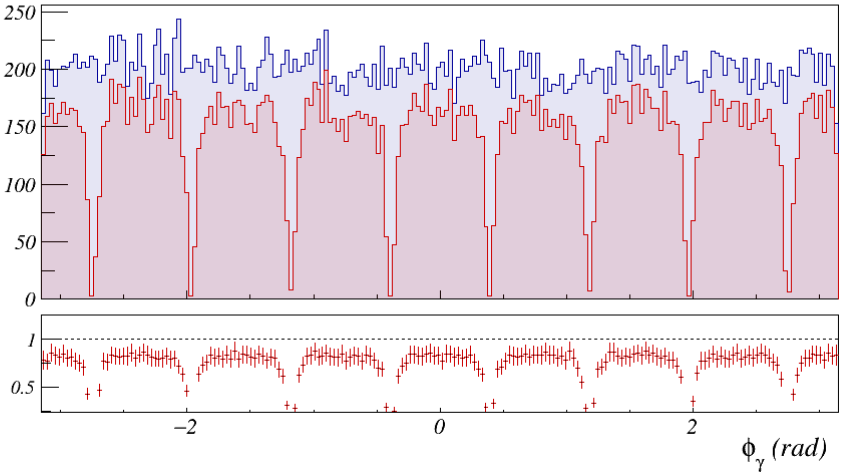




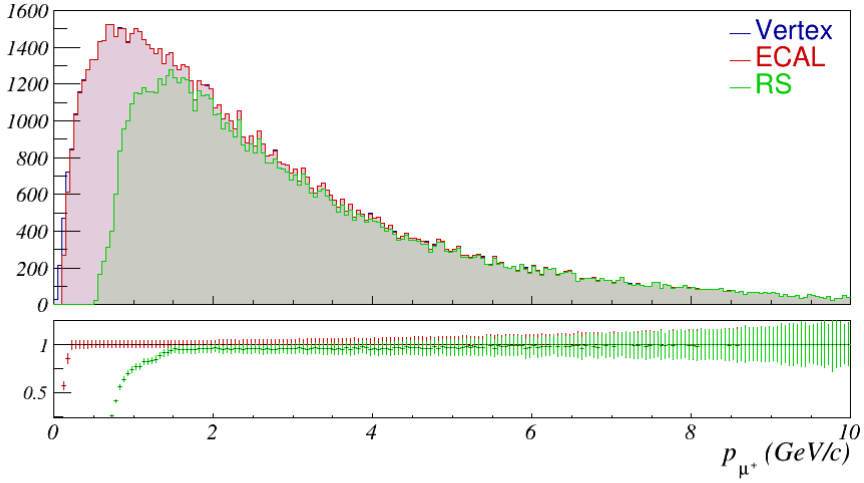
Detector	Solenoid %	Toroid %
ECAL	94.3	73.1

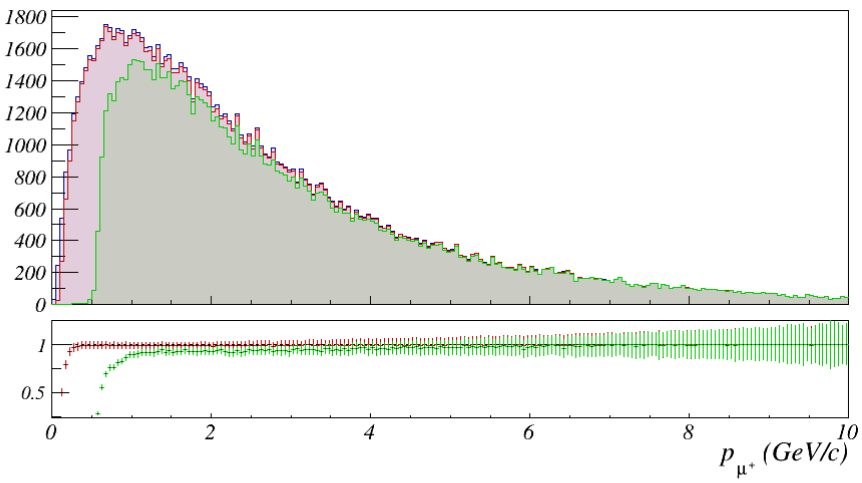
Solenoid vs toroid: μ^+

Solenoid

Toroid

p





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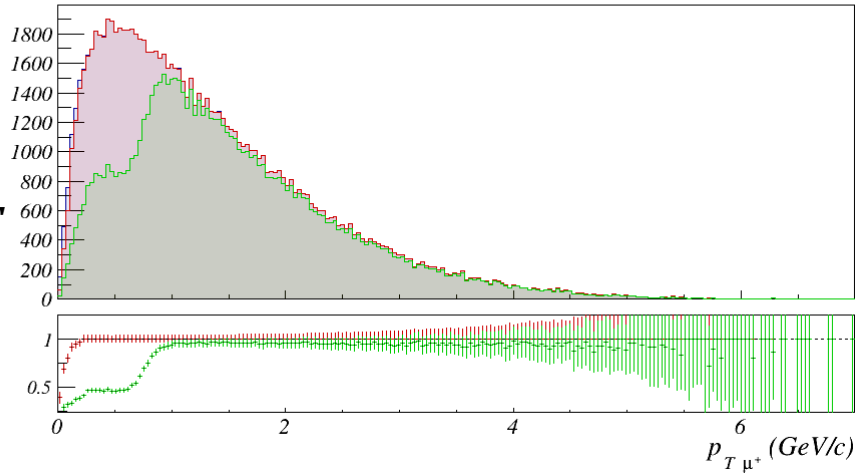
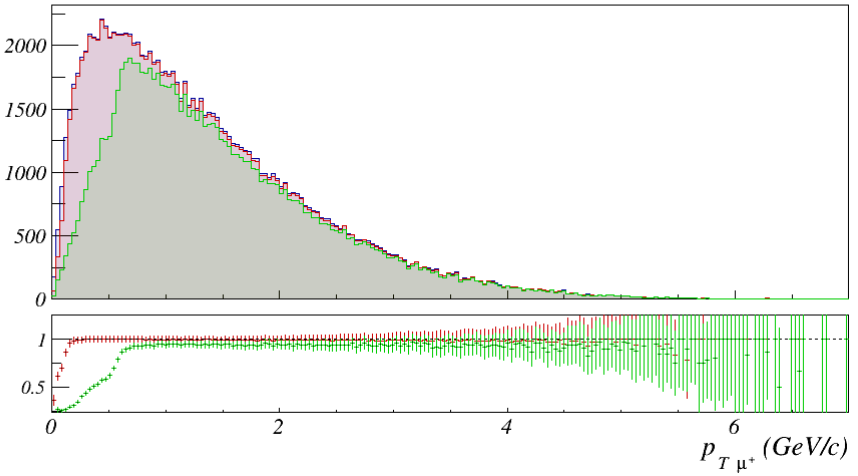




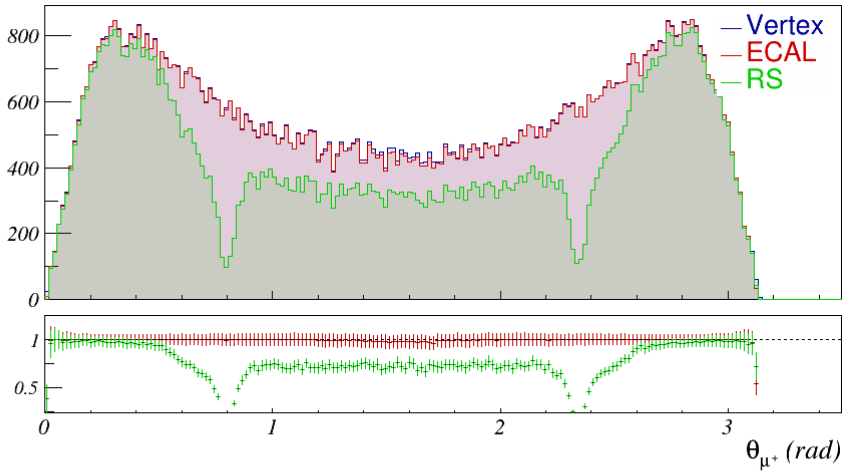
Detector	Solenoid %	Toroid %
ECAL	98.61	96.27
RS	58.89	66.25

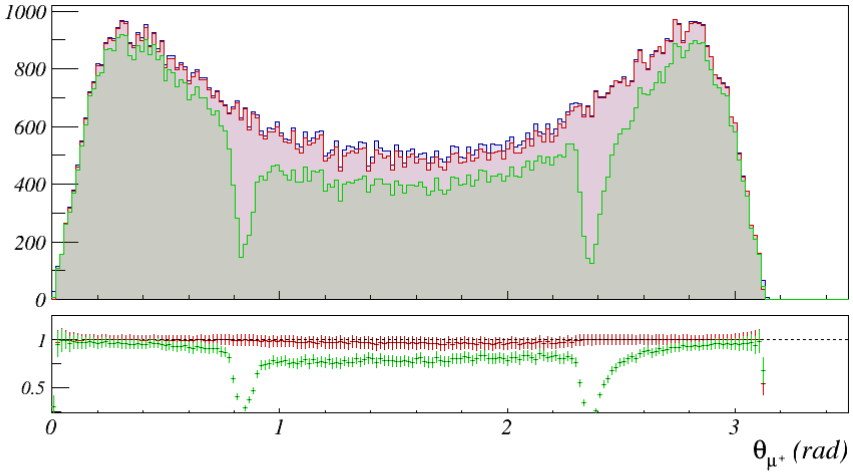
Solenoid vs toroid: μ^+

Solenoid

Toroid

θ





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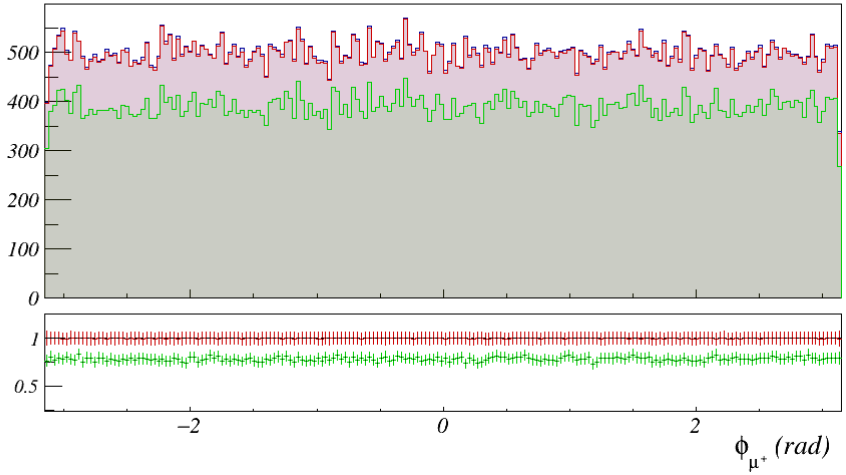
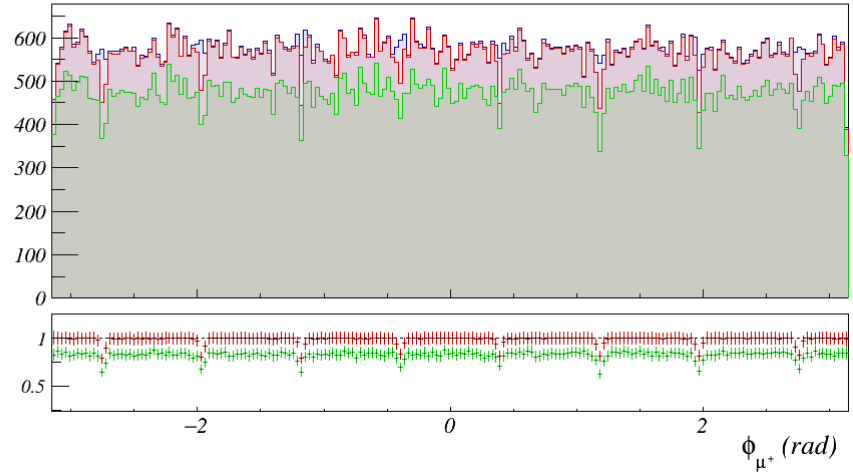




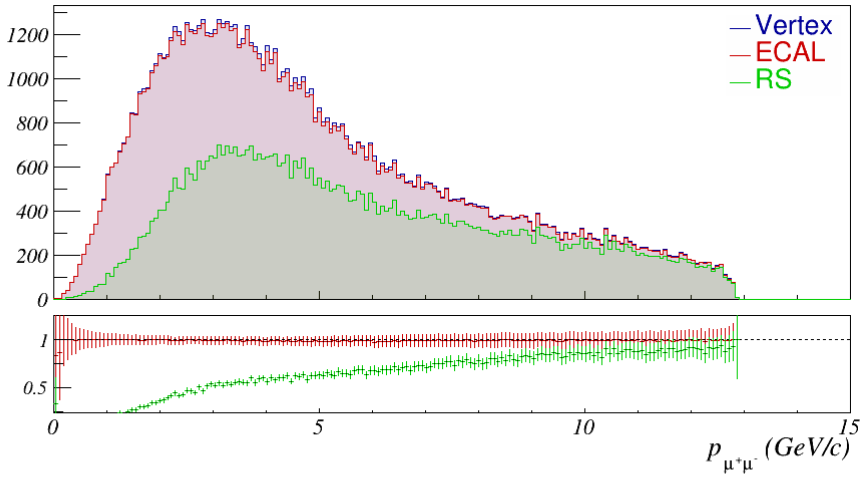
Detector	Solenoid %	Toroid %
ECAL	99.35	98.17
RS	78.03	82.21

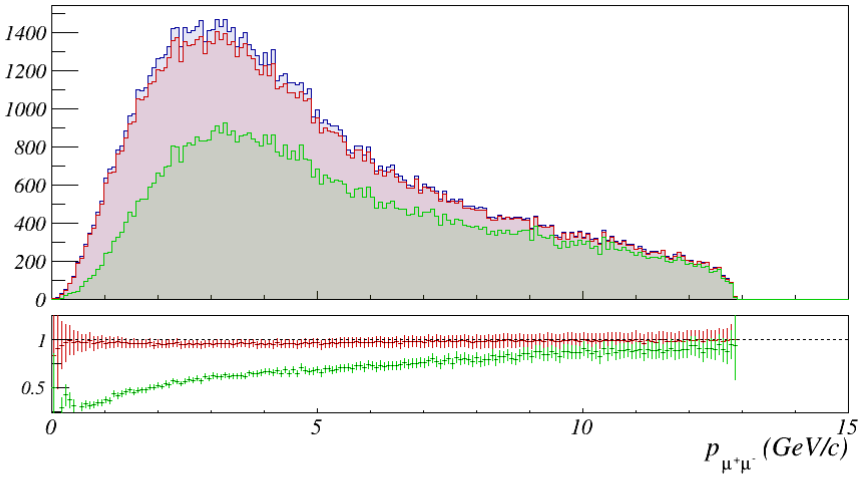
Solenoid vs toroid: $DY \rightarrow \mu^+\mu^-$

Solenoid

Toroid

p





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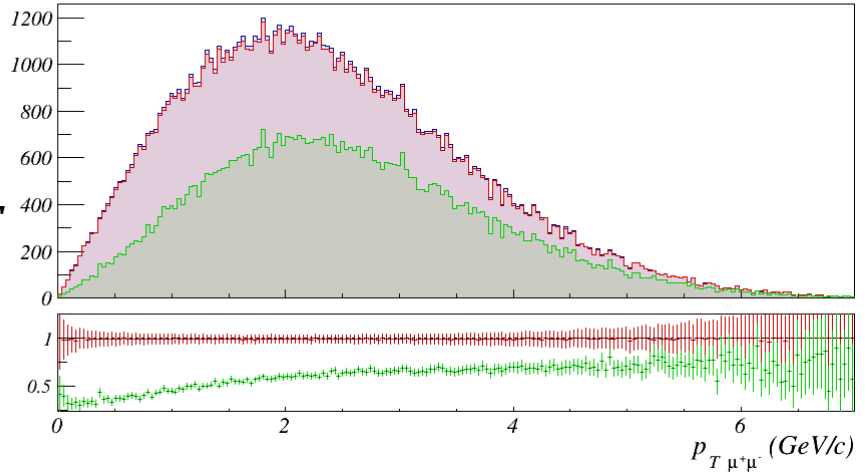

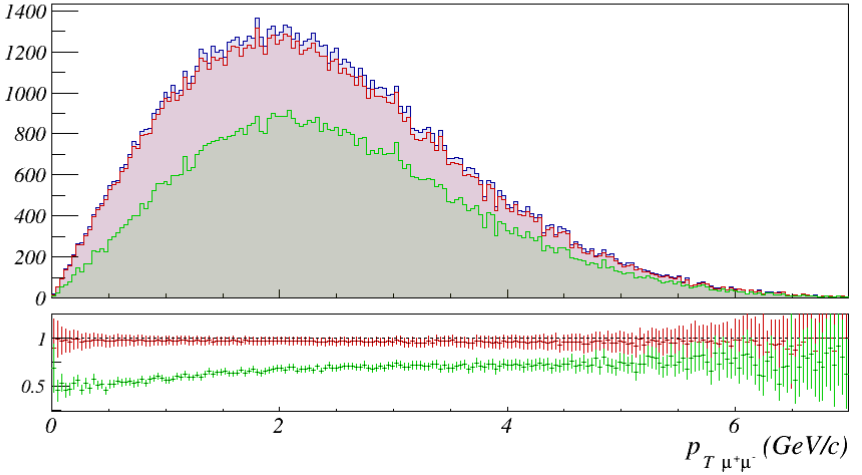

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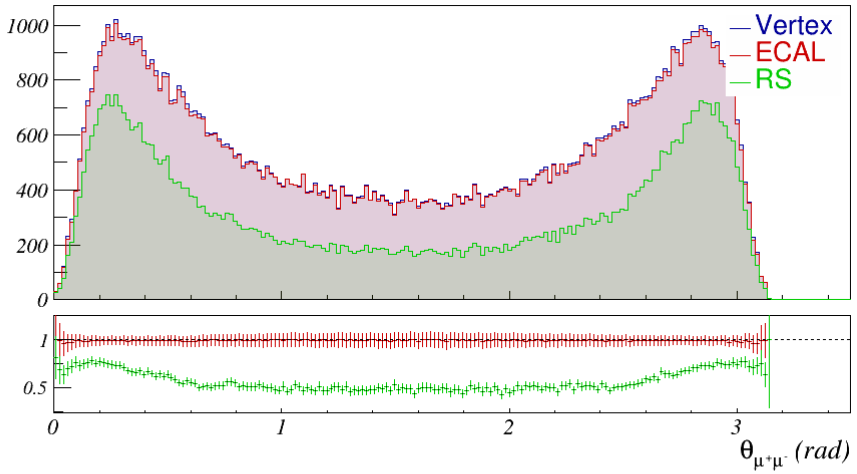
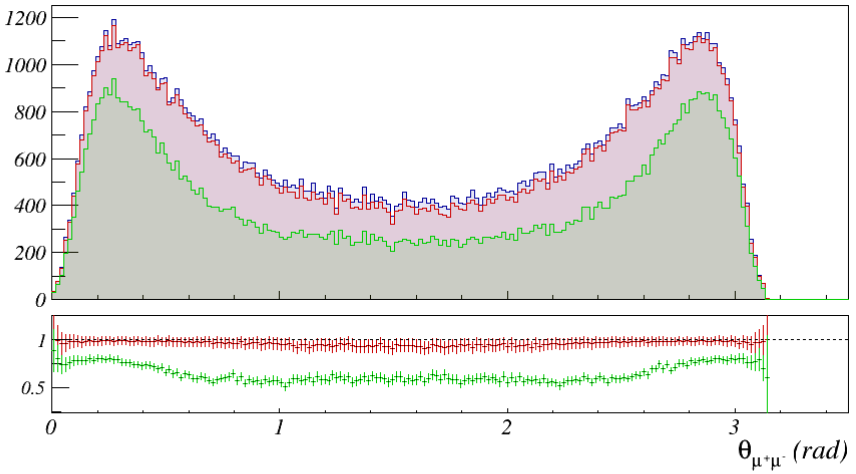
Solenoid vs toroid: $DY \rightarrow \mu^+\mu^-$

Solenoid

Toroid

θ





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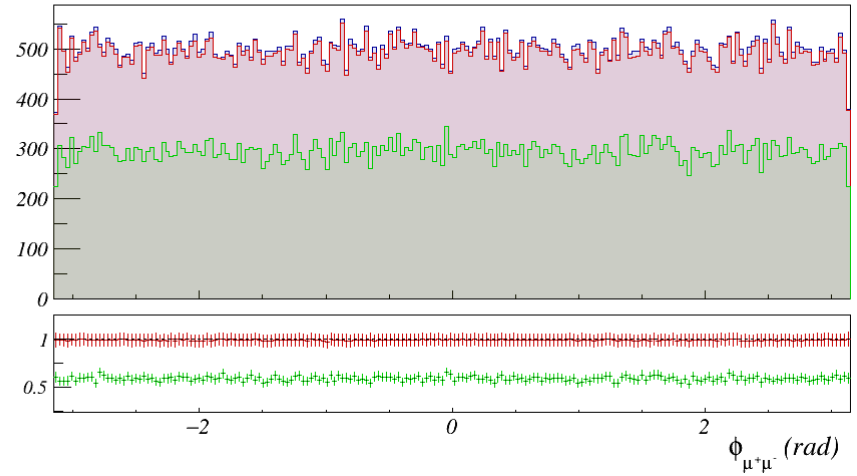

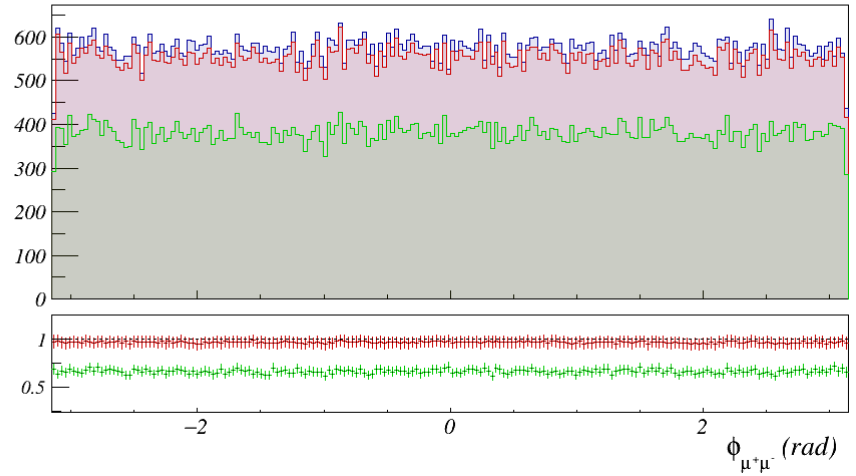

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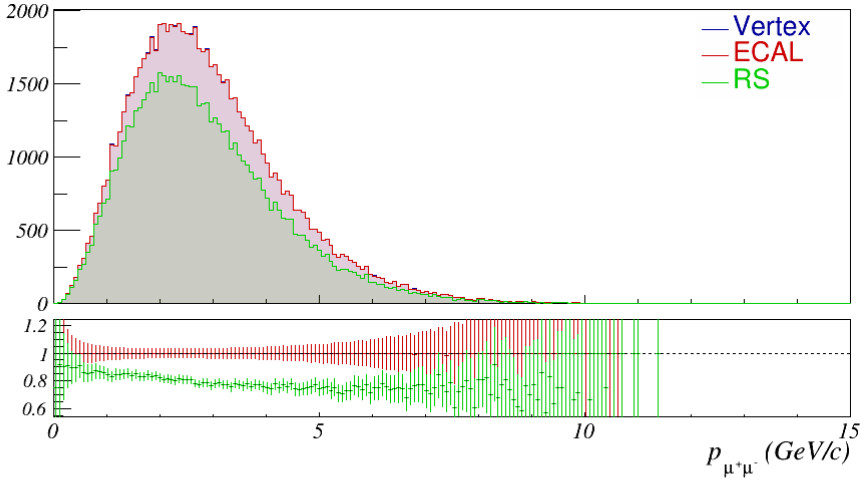
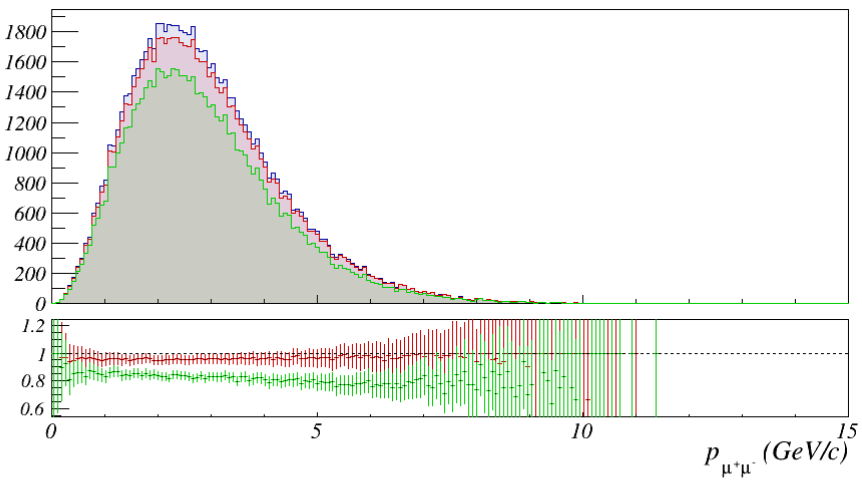
Solenoid vs toroid: $J/\psi \rightarrow \mu^+\mu^-$

Solenoid

Toroid

p





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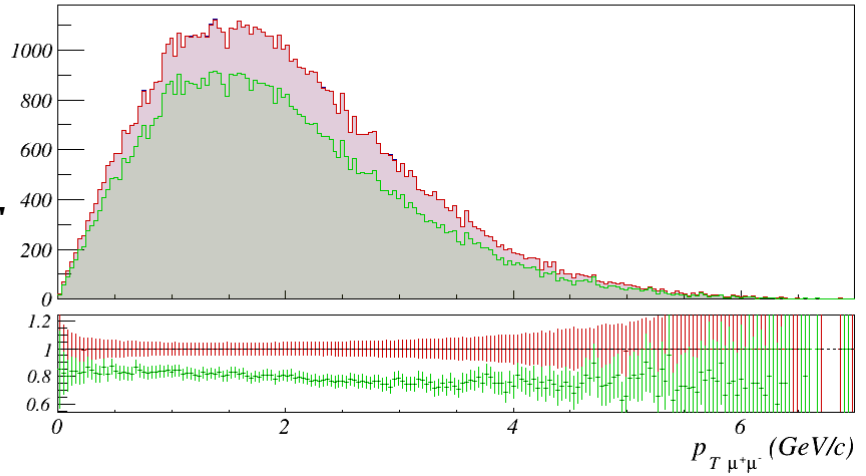
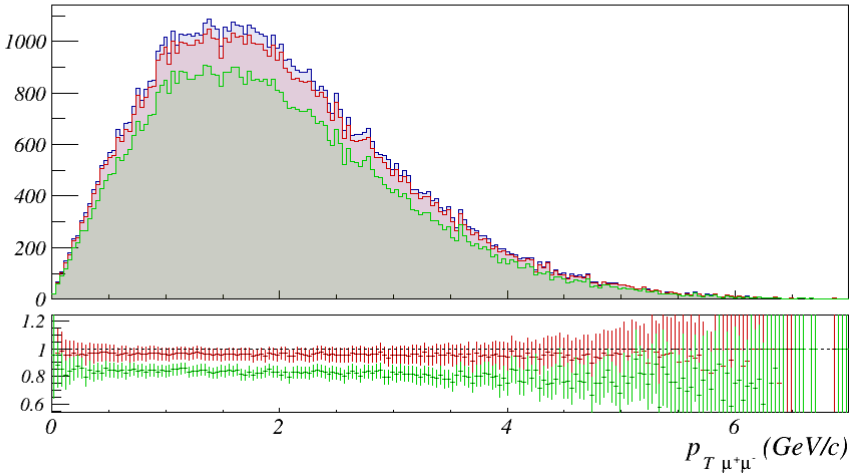




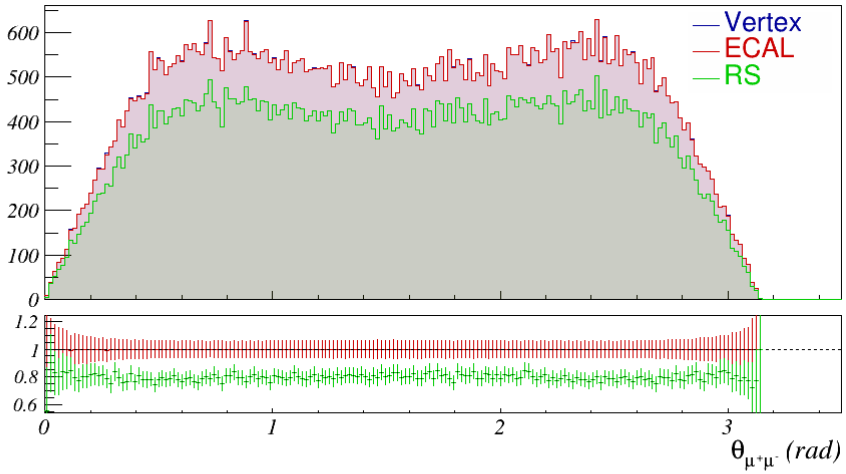
Detector	Solenoid %	Toroid %
ECAL	99.91	95.93
RS	79.67	82.68

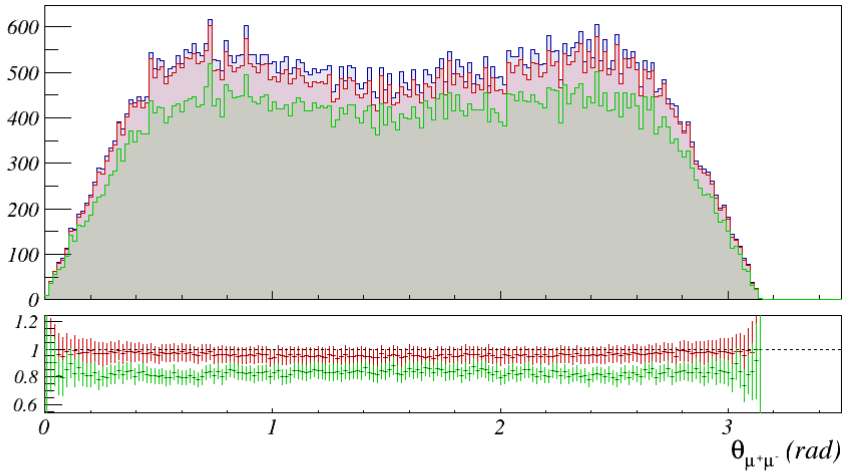
Solenoid vs toroid: $J/\psi \rightarrow \mu^+\mu^-$

Solenoid

Toroid

θ





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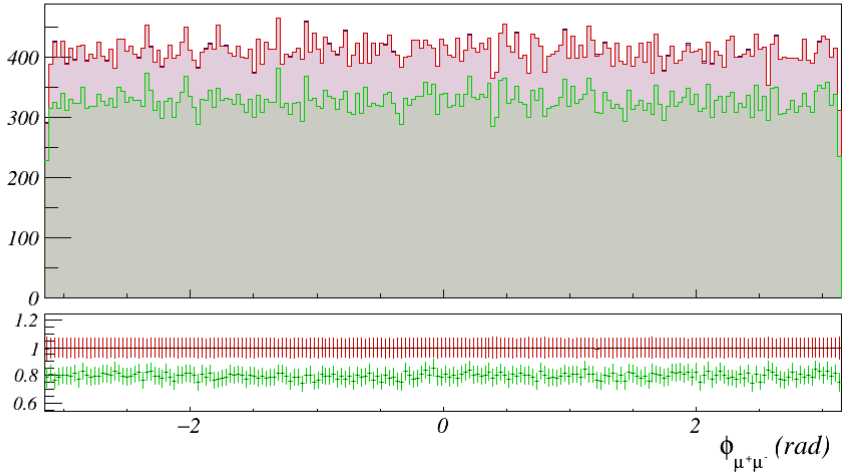

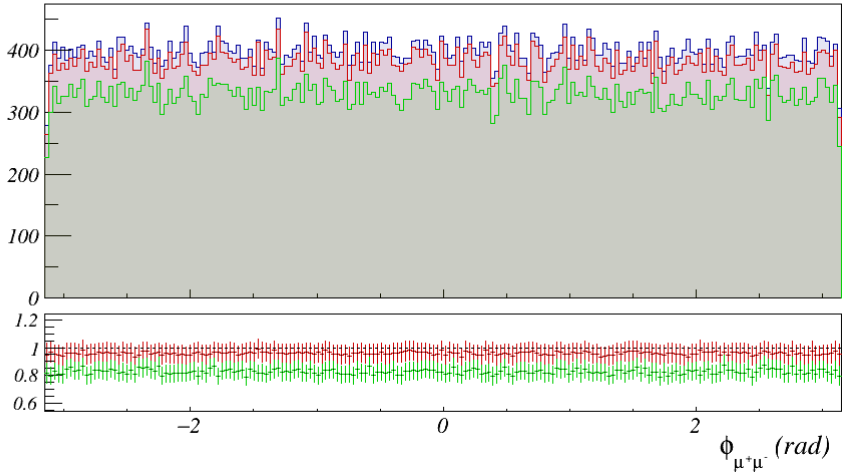

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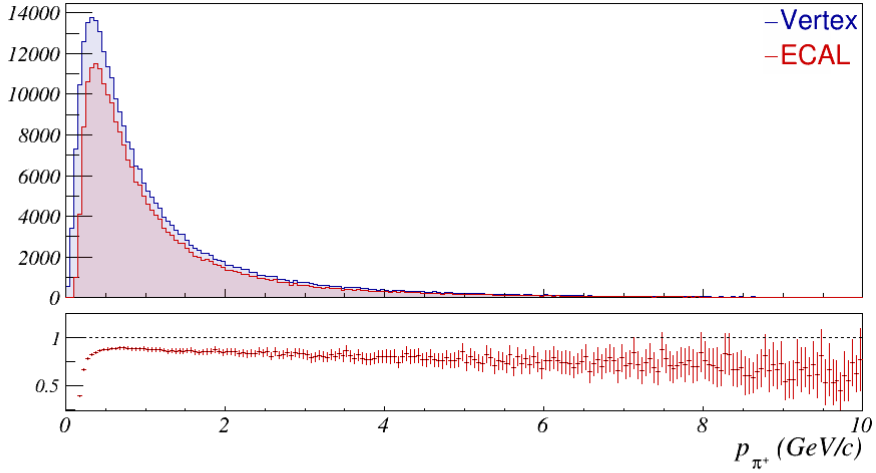
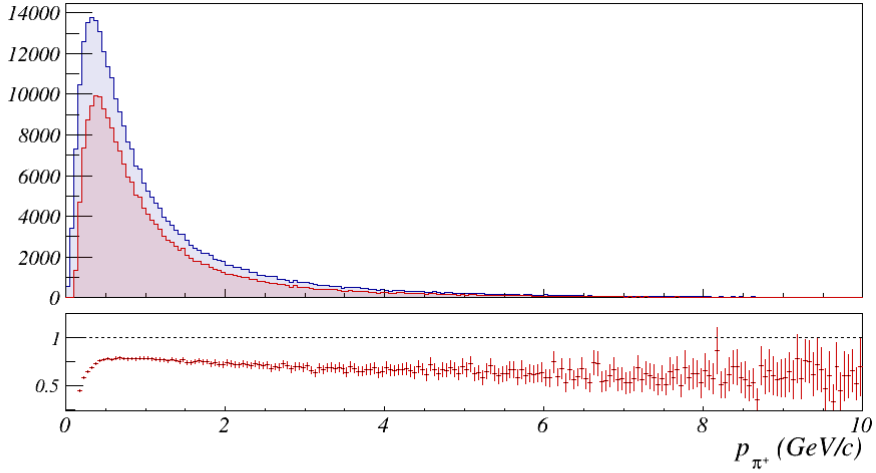
Solenoid vs toroid: $\pi^{\pm}$

Solenoid

Toroid

p





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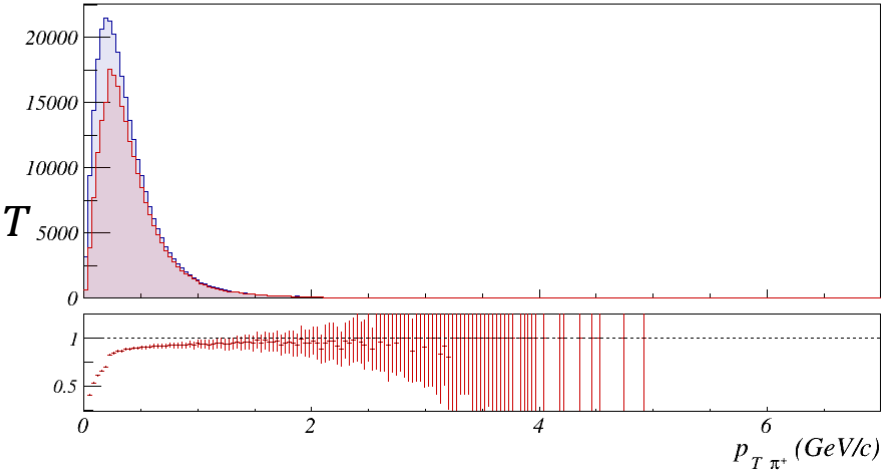
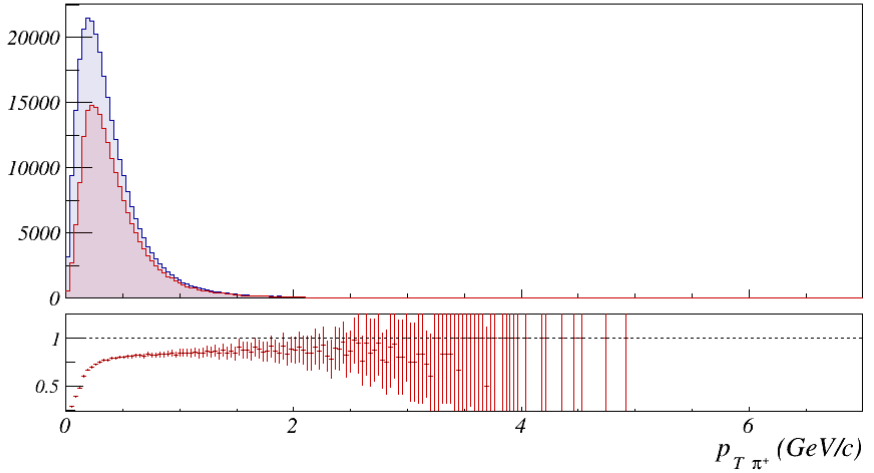
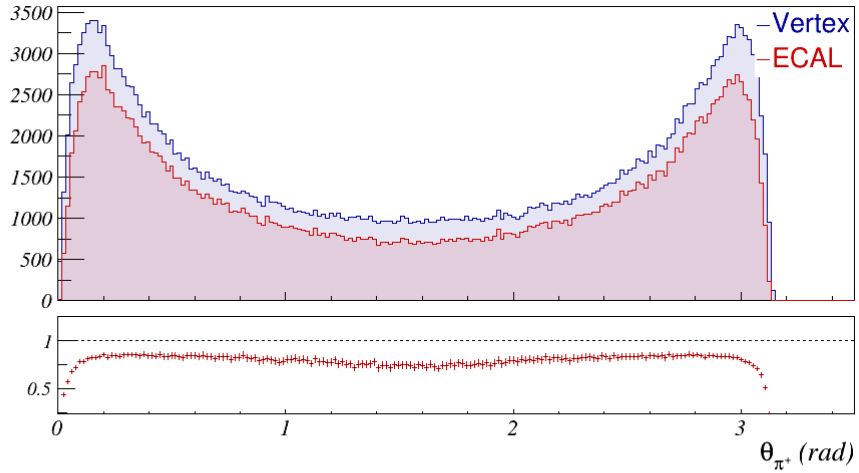


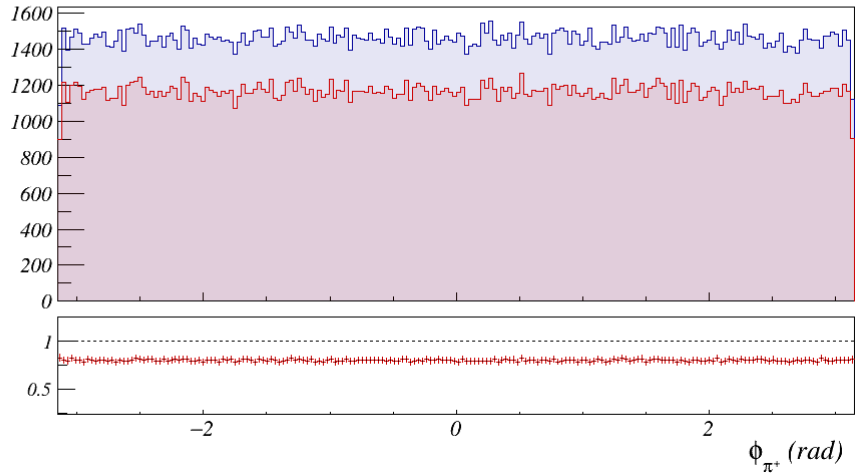


Detector	Solenoid %	Toroid %
ECAL	79.74	69.86

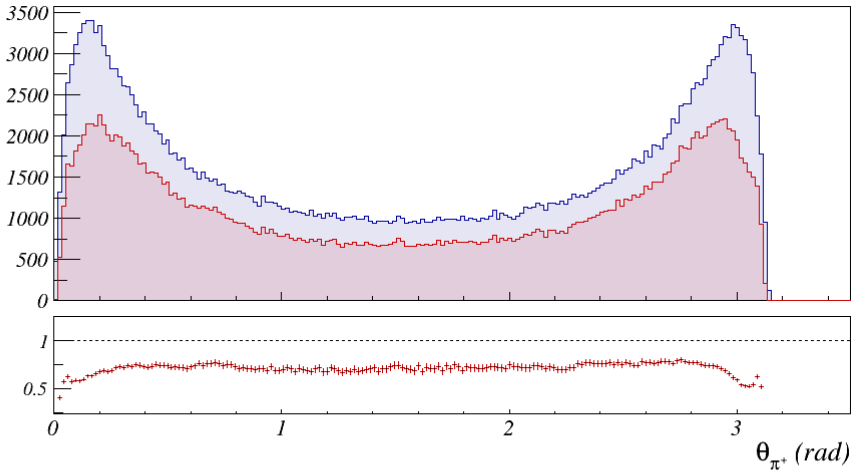
Solenoid vs toroid: $\pi^{\pm}$

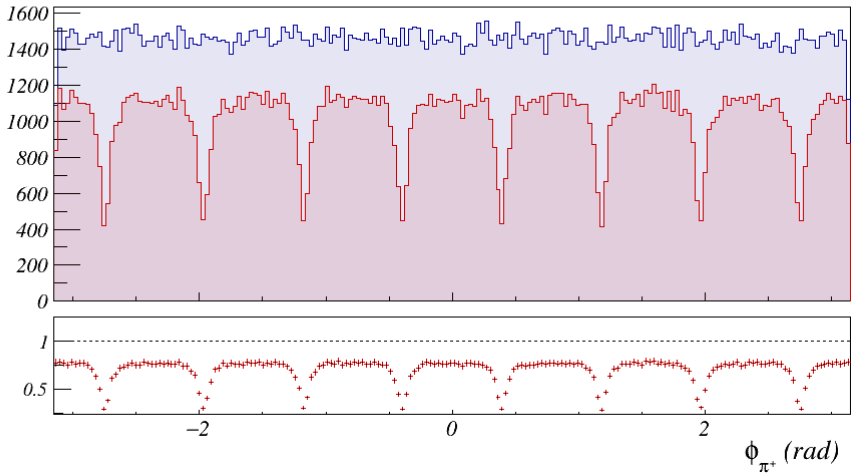
Solenoid





Toroid





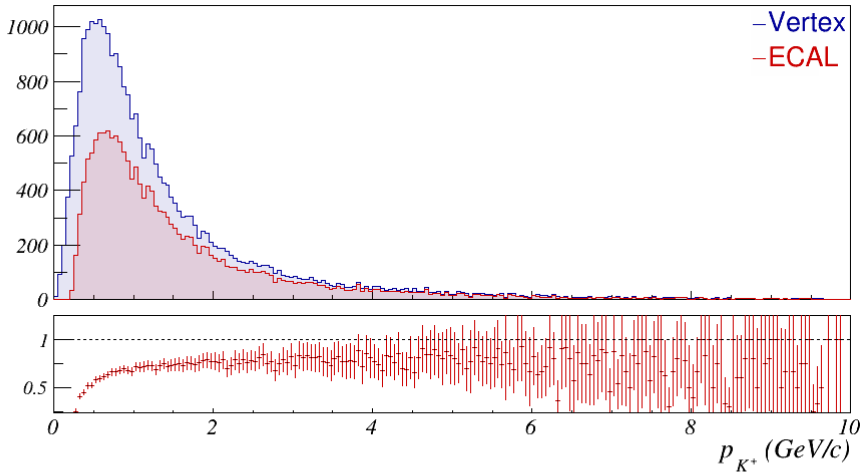
Detector	Solenoid %	Toroid %
ECAL	79.74	69.86

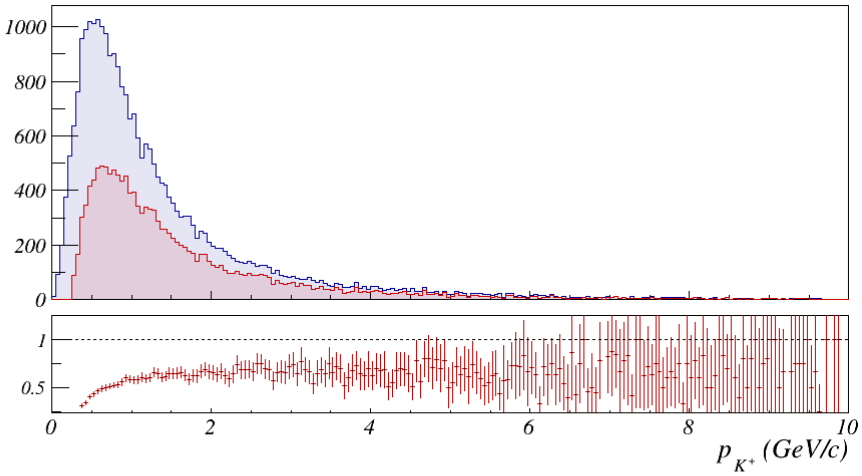
Solenoid vs toroid: $K^{\pm}$

Solenoid

Toroid

p





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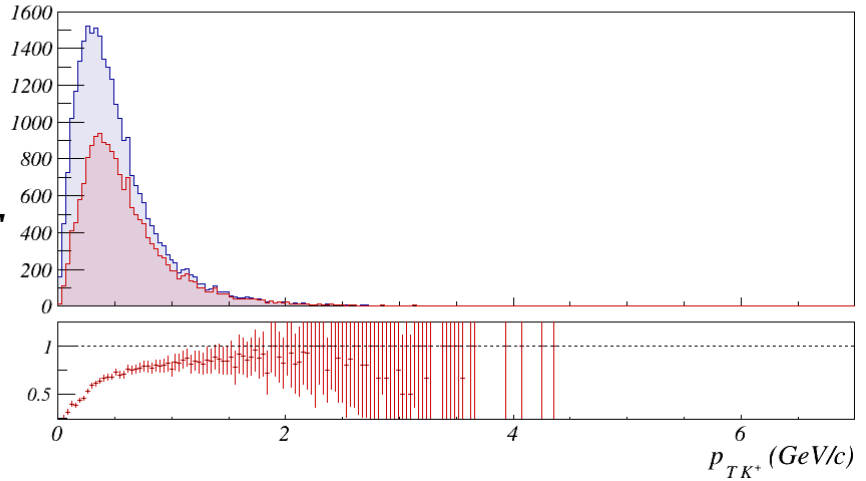
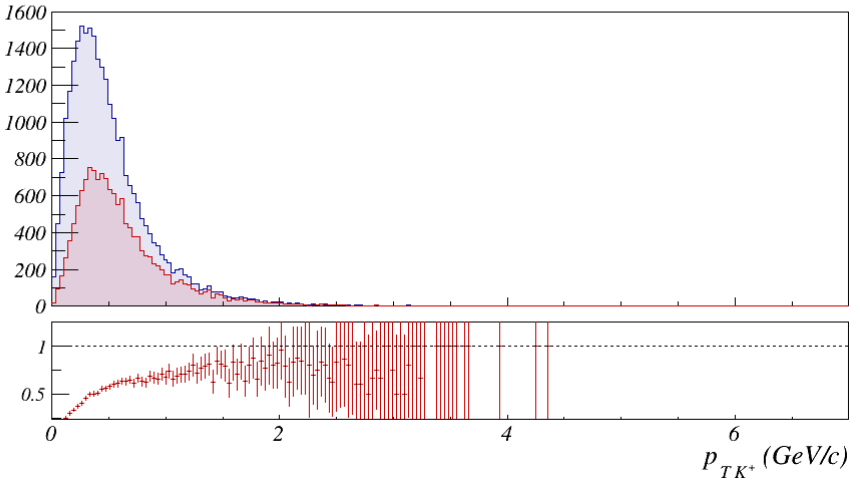




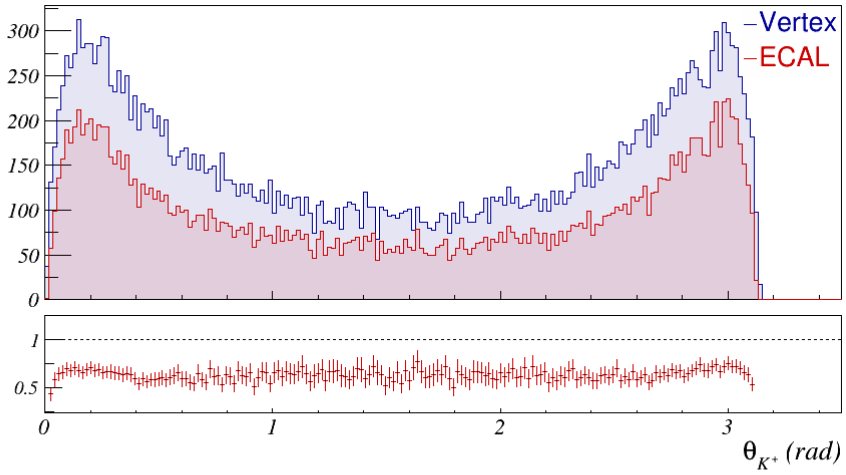
Detector	Solenoid %	Toroid %
ECAL	63.60	51.95

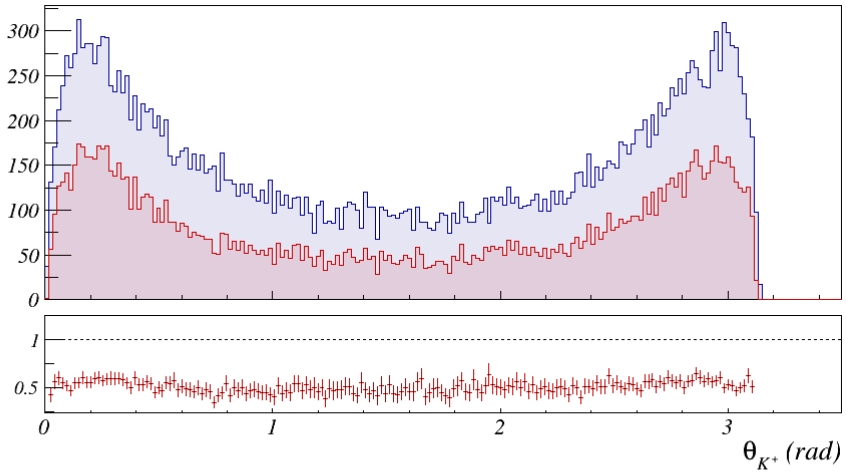
Solenoid vs toroid: $K^{\pm}$

Solenoid

Toroid

θ





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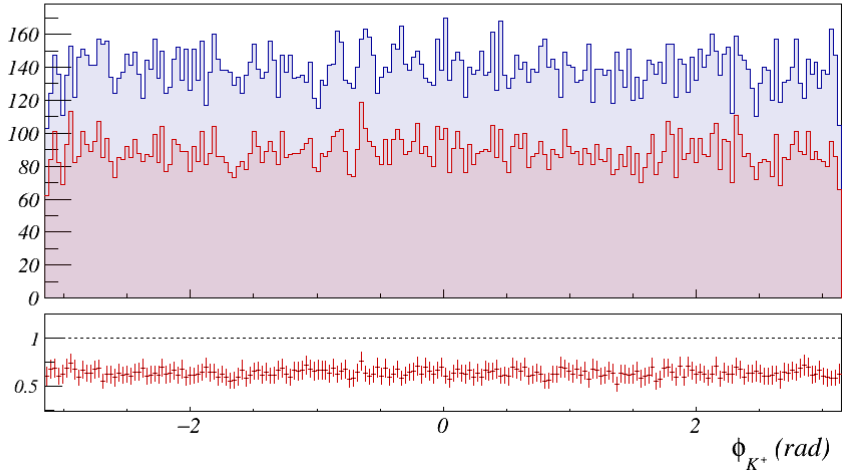
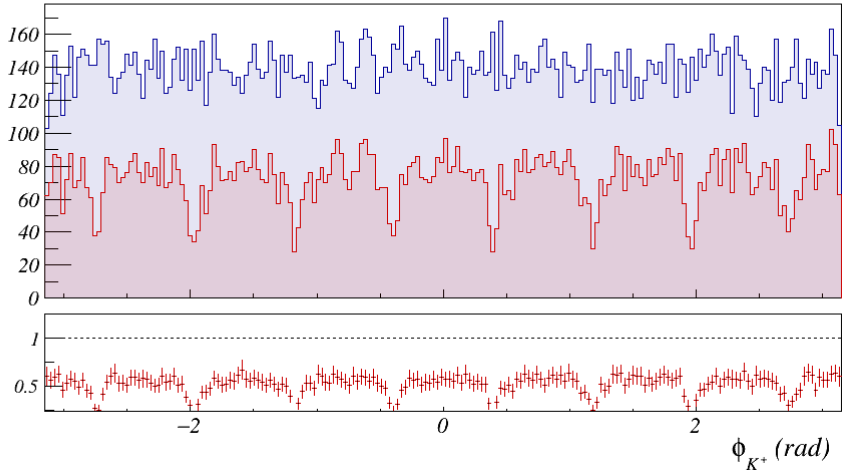




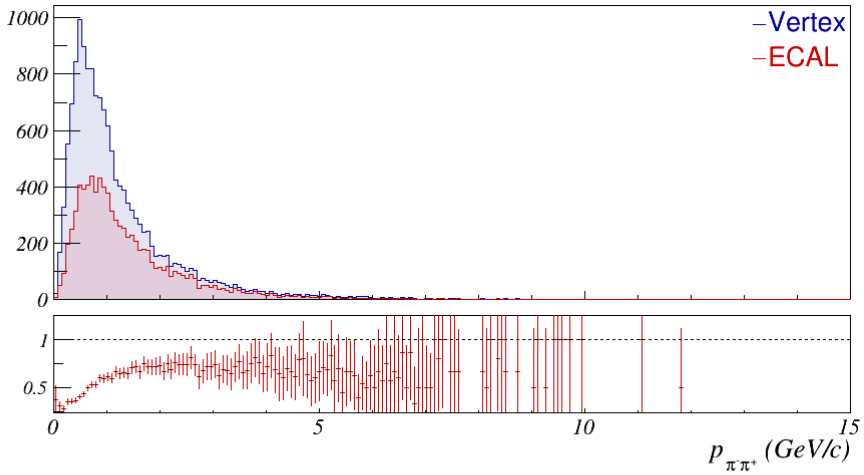
Detector	Solenoid %	Toroid %
ECAL	63.60	51.95

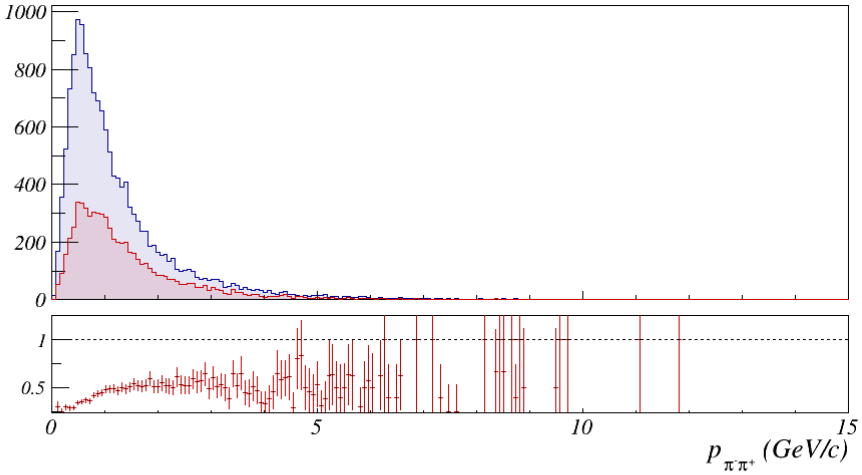
Solenoid vs toroid: $K^0 \rightarrow \pi^- \pi^+$

Solenoid

Toroid

p





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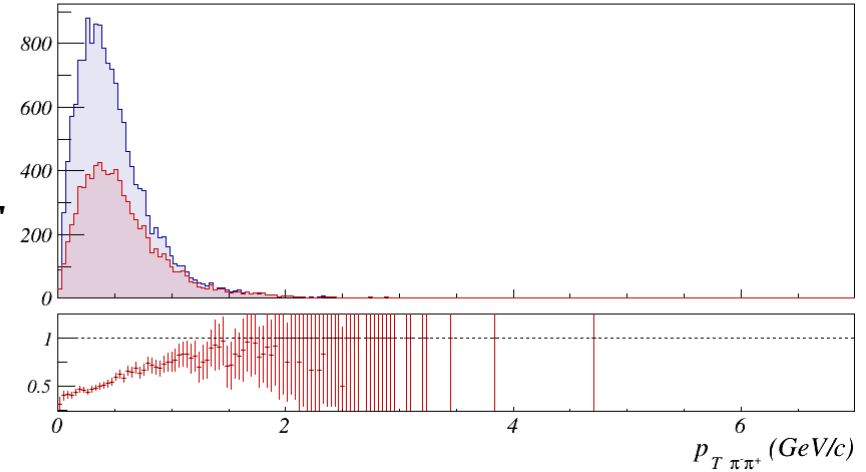
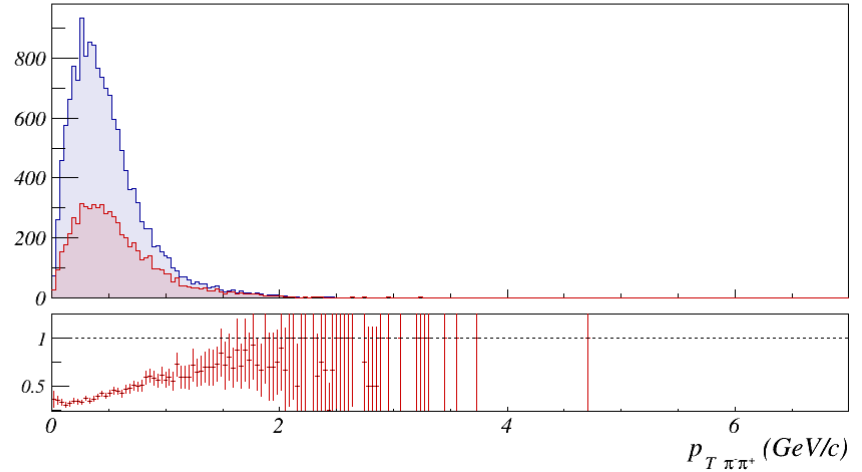




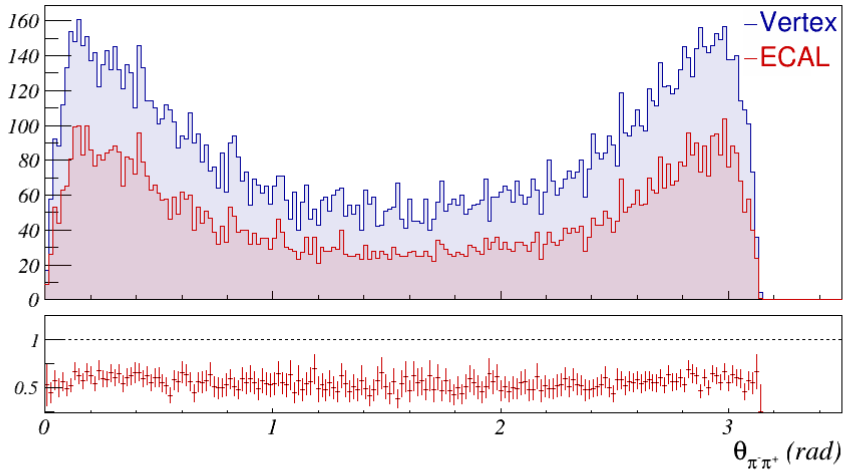
Detector	Solenoid %	Toroid %
ECAL	55.92	42.69

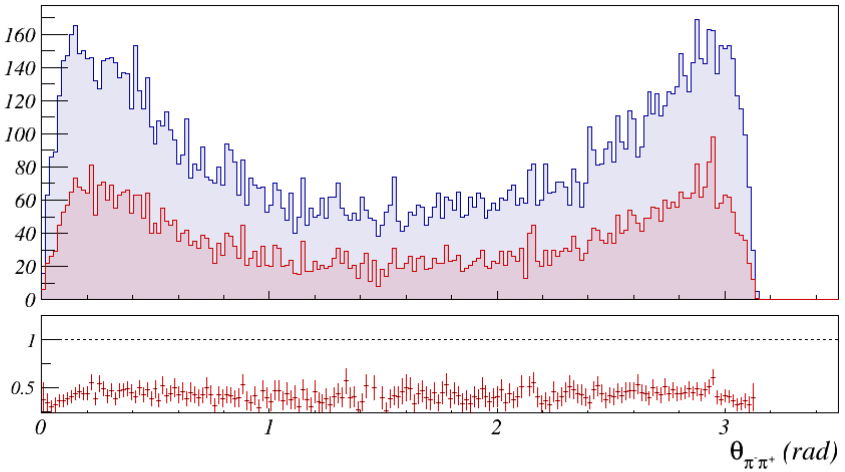
Solenoid vs toroid: $K^0 \rightarrow \pi^- \pi^+$

Solenoid

Toroid

θ





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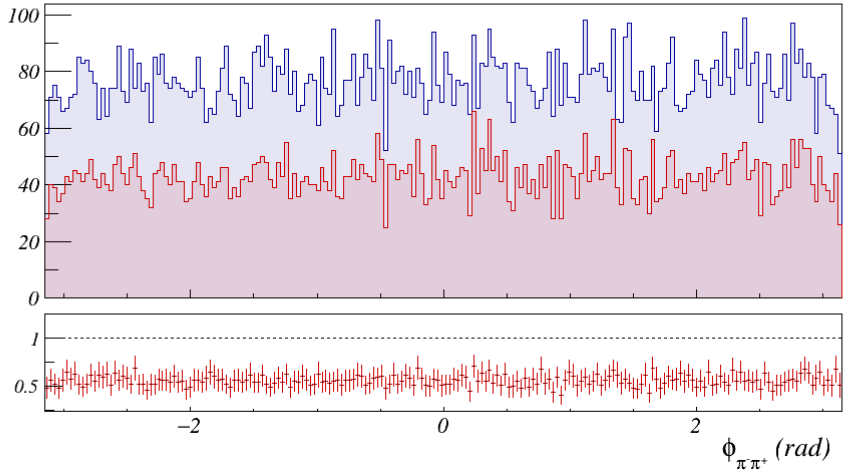
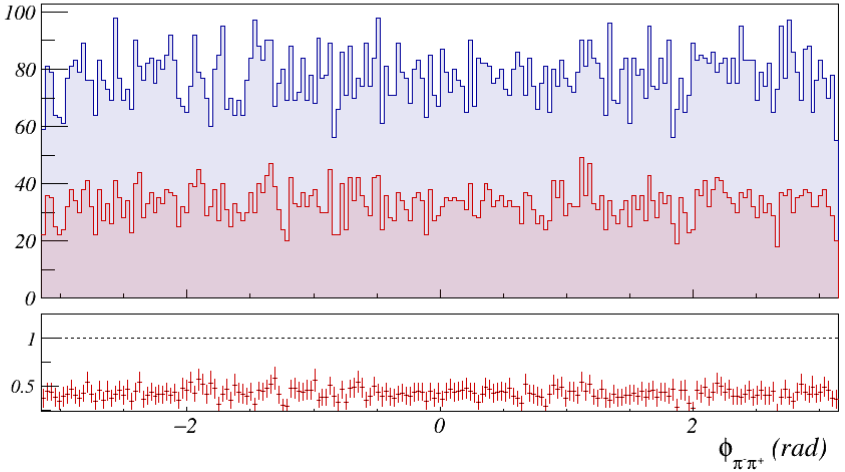




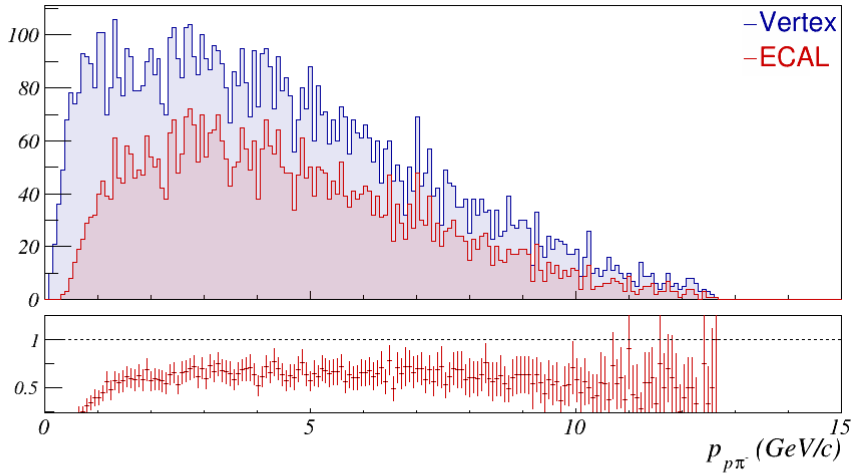
Detector	Solenoid %	Toroid %
ECAL	55.92	42.69

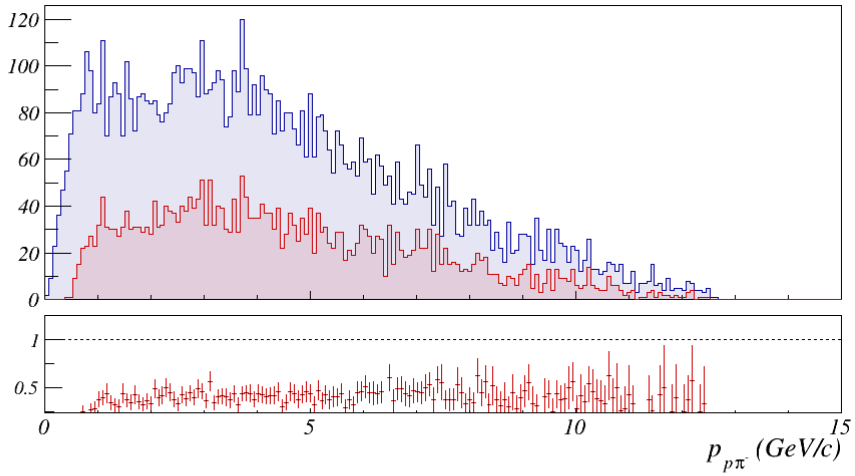
Solenoid vs toroid: $\Lambda \rightarrow p\pi^-$

Solenoid

Toroid

p





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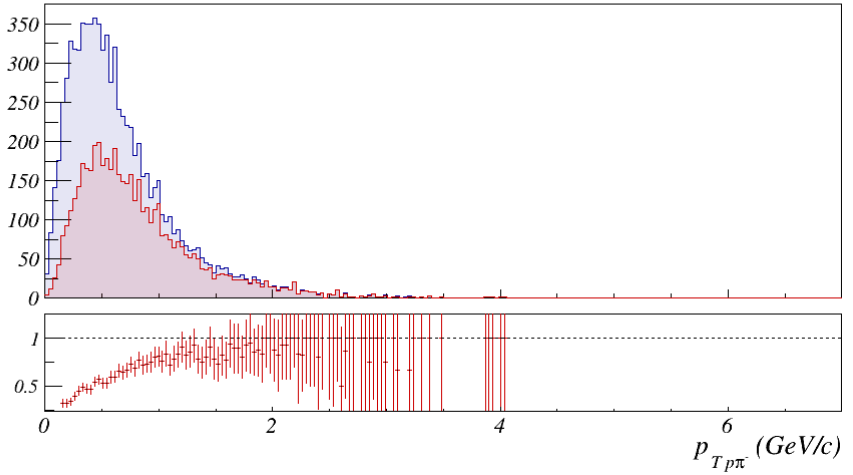
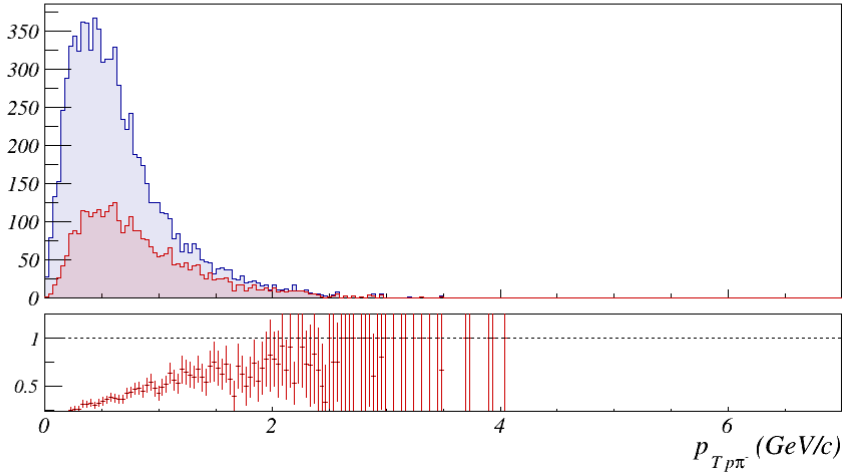




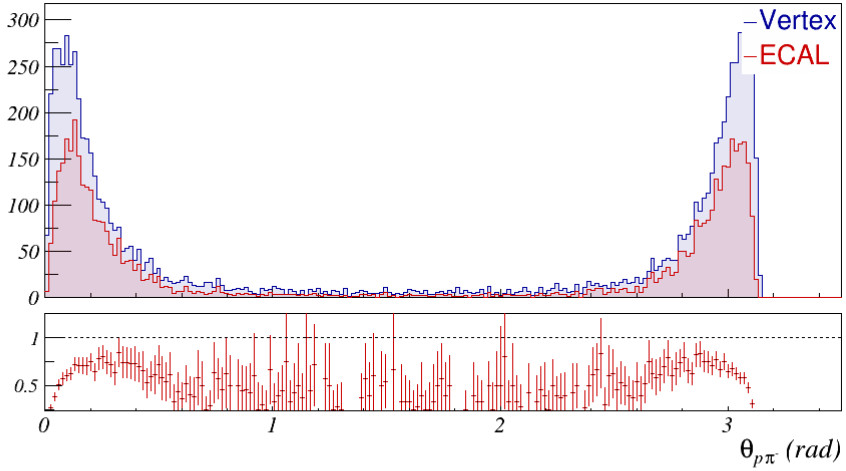
Detector	Solenoid %	Toroid %
ECAL	63.60	51.95

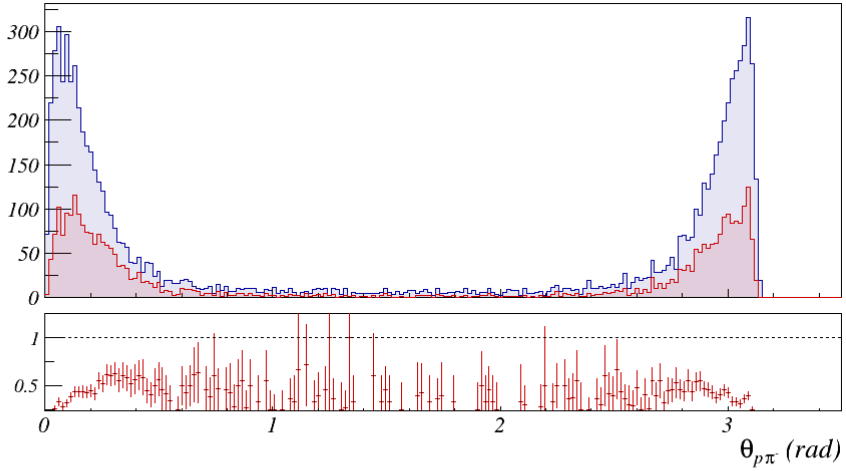
Solenoid vs toroid: $\Lambda \rightarrow p\pi^-$

Solenoid

Toroid

θ





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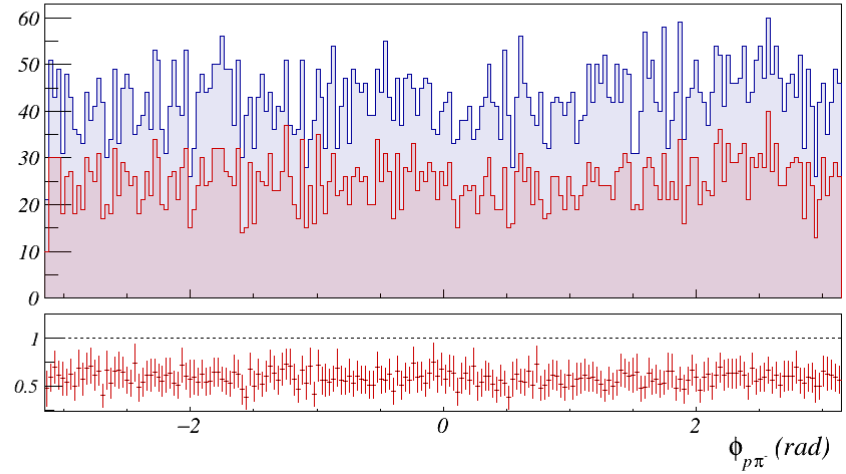
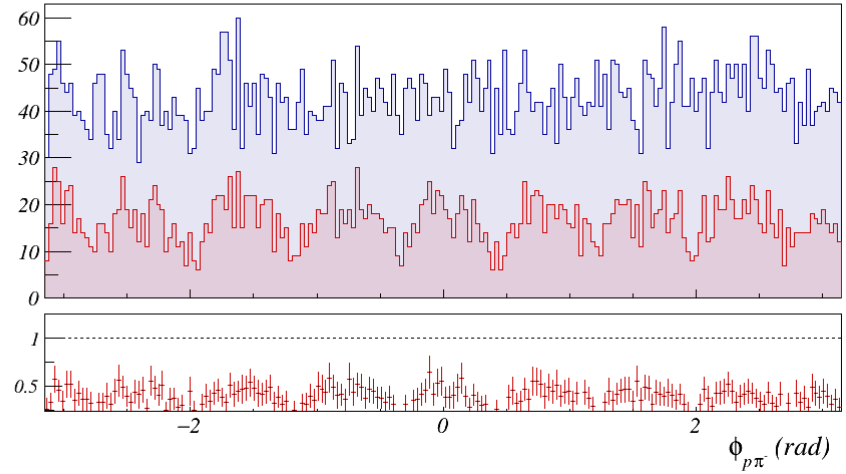




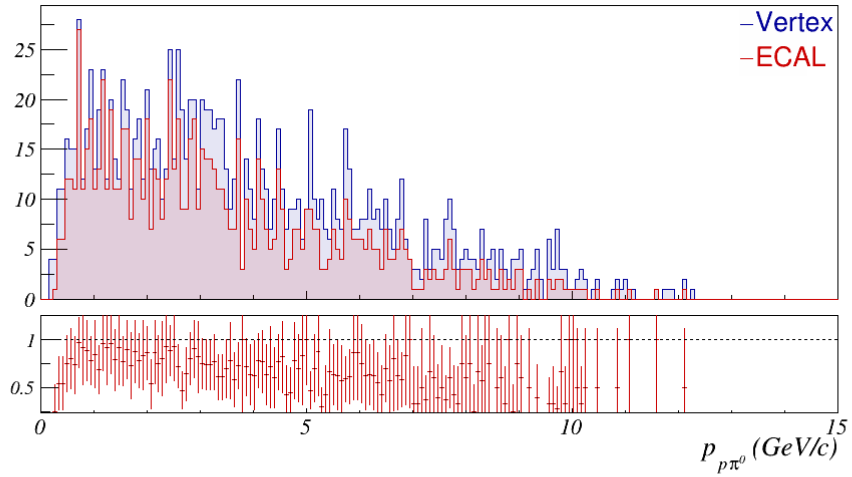
Detector	Solenoid %	Toroid %
ECAL	58.59	38.70

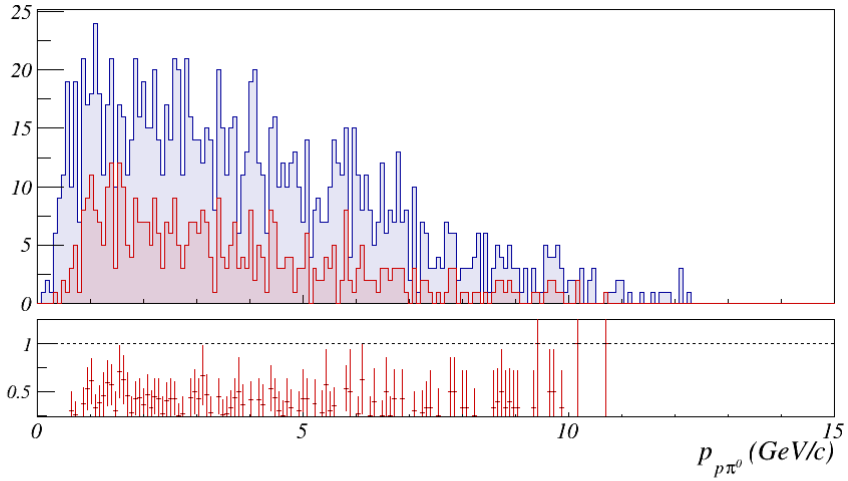
Solenoid vs toroid: $\Sigma^+ \rightarrow p\pi^0$

Solenoid

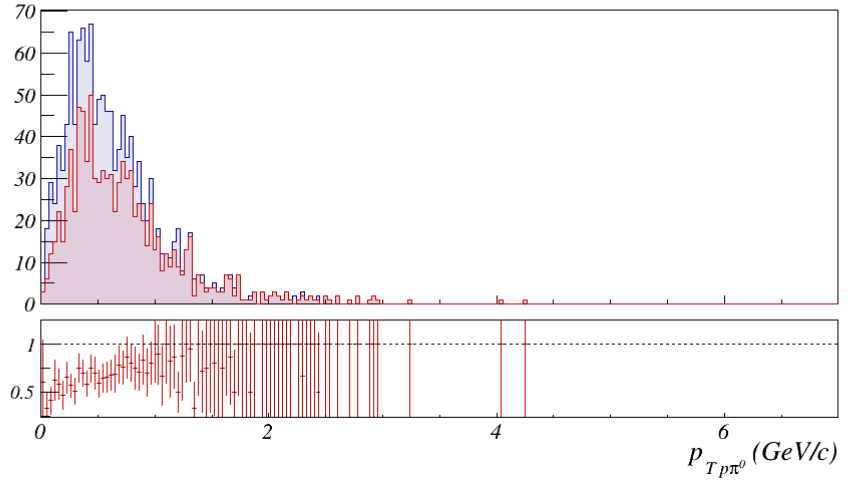
Toroid

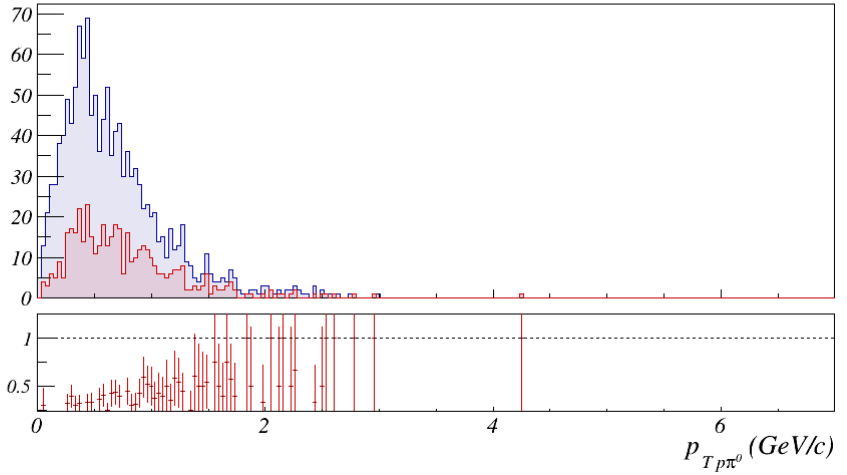
p





p_T





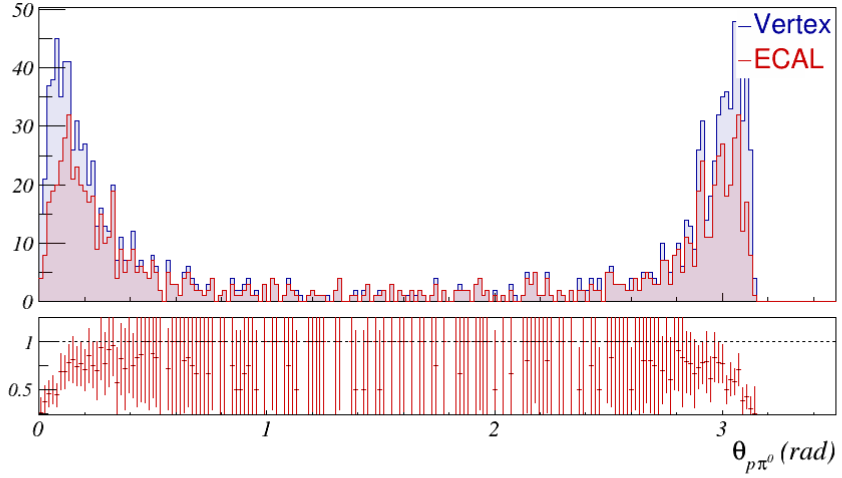
Detector	Solenoid %	Toroid %
ECAL	69.97	34.24

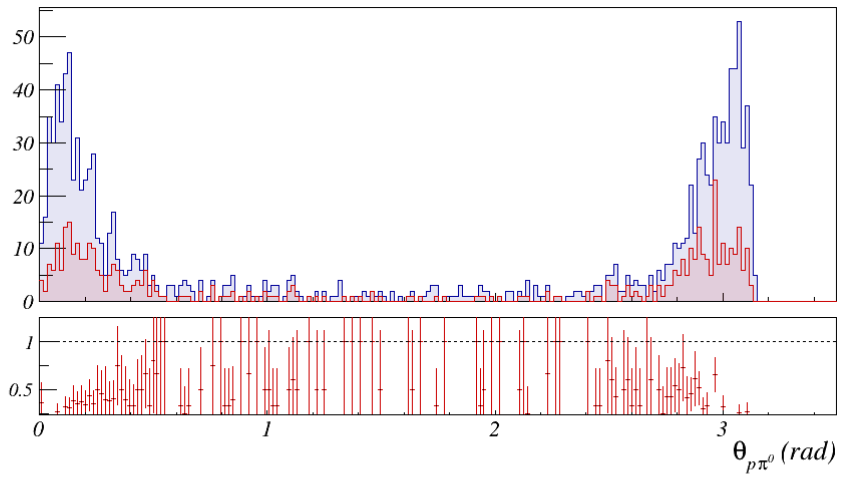
Solenoid vs toroid: $\Sigma^+ \rightarrow p\pi^0$

Solenoid

Toroid

θ





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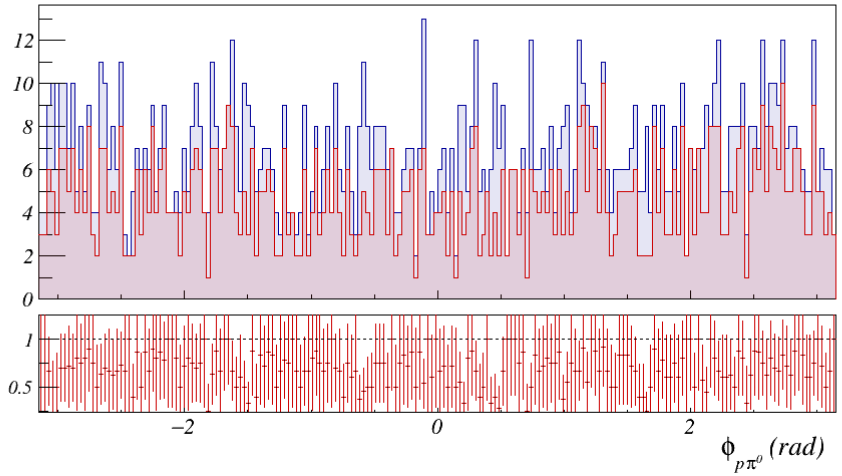

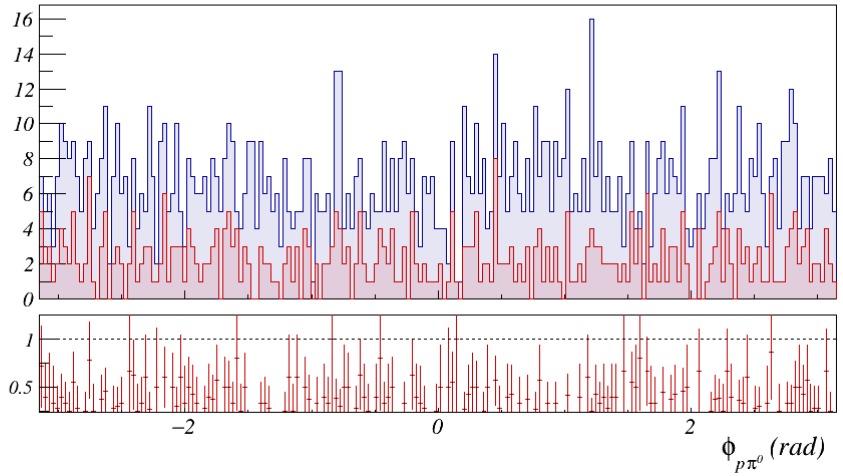

Detector	Solenoid %	Toroid %
ECAL	69.97	34.24

Conclusion

Particles	Solenoid %	Toroid %
γ	94.3 (ECAL)	73.1 (ECAL)
$\pi^0 \rightarrow \gamma\gamma$	88.2 (ECAL)	52.9 (ECAL)
$\mu^{\pm}$	78.03 (RS)	82.21 (RS)
$\pi^{\pm}$	79.74 (ECAL)	69.86 (ECAL)
$K^{\pm}$	63.60 (ECAL)	51.95 (ECAL)
$\mathrm{J/\psi} \rightarrow \mu^+\mu^-$	79.67 (RS)	82.68 (RS)
$\mathrm{DY} \rightarrow \mu^+\mu^-$	58.89 (RS)	66.25 (RS)
$\Lambda \rightarrow \mathrm{p}\pi^-$	58.59 (ECAL)	38.70 (ECAL)
$K^0 \rightarrow \pi^-\pi^+$	55.92 (ECAL)	42.69 (ECAL)
$\Sigma^+ \rightarrow \mathrm{p}\pi^0$	69.97 (ECAL)	34.24 (ECAL)