SPD MEETING

Influence of the hybrid magnet structure on different particle types

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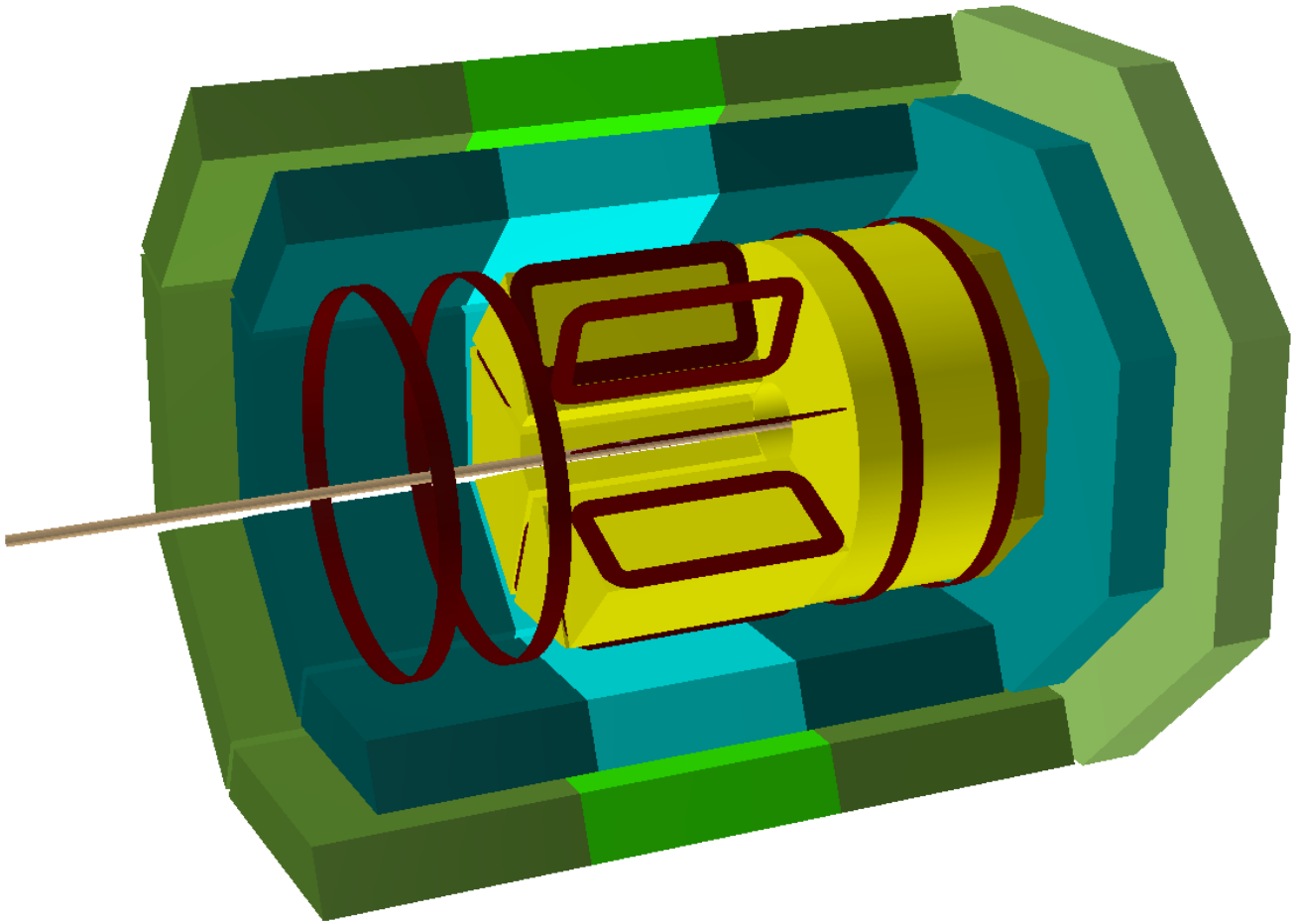
Settings

Tools: SPDRoot + Pythia 6 - https://git.jinr.ru/grias/spdroot

Data: Hybrid Solenoidal and Toroidal SPD set-up with 1 000 000 events; p – p collision with √s = 26 GeV.

- Minimum bias

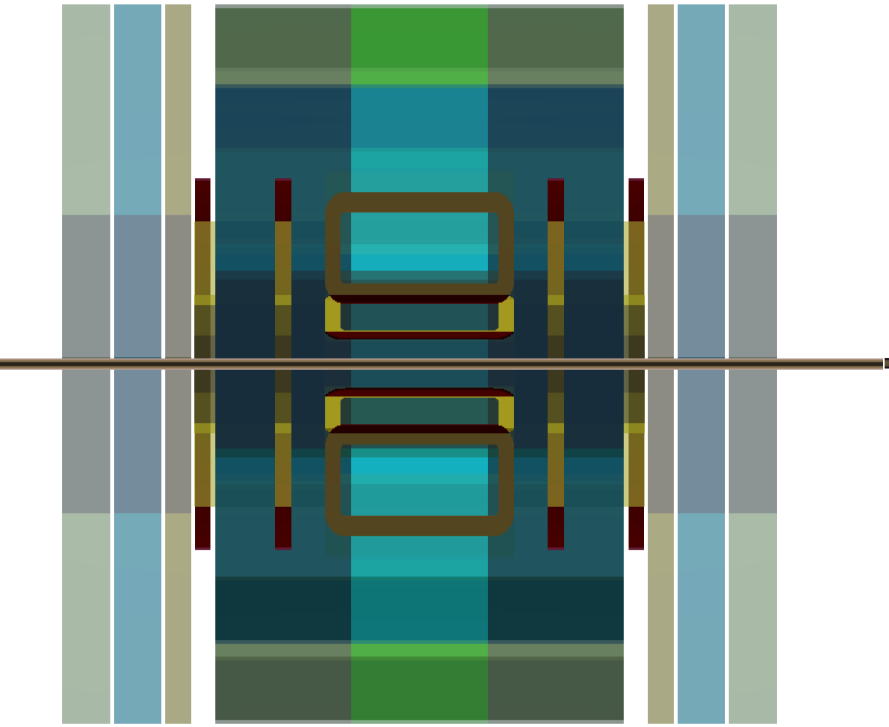
RS
ECAL
TS
MAGNET



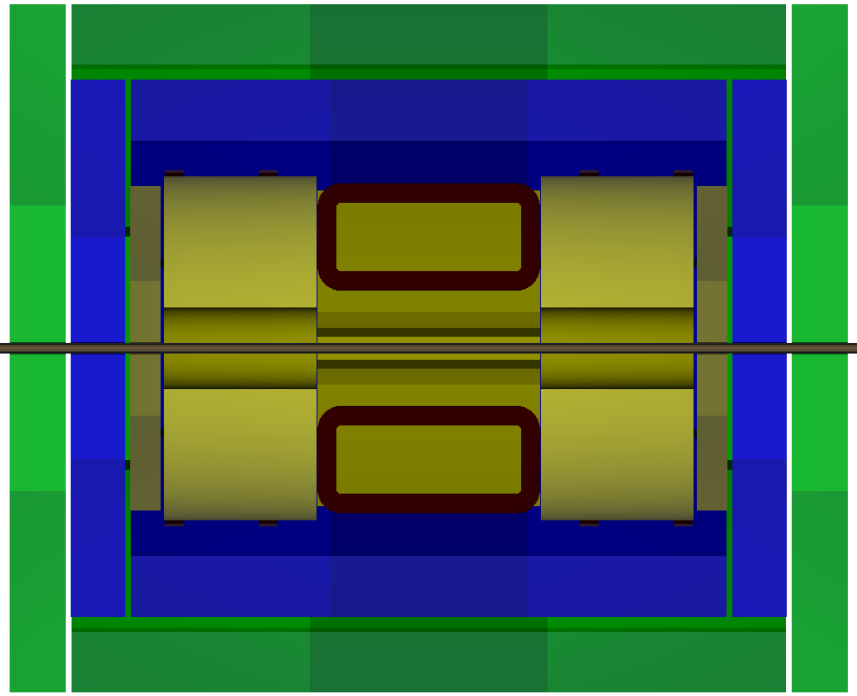
Geometry changes: Rho-Z

RS
ECAL
TS
MAGNET

Old composition



New composition

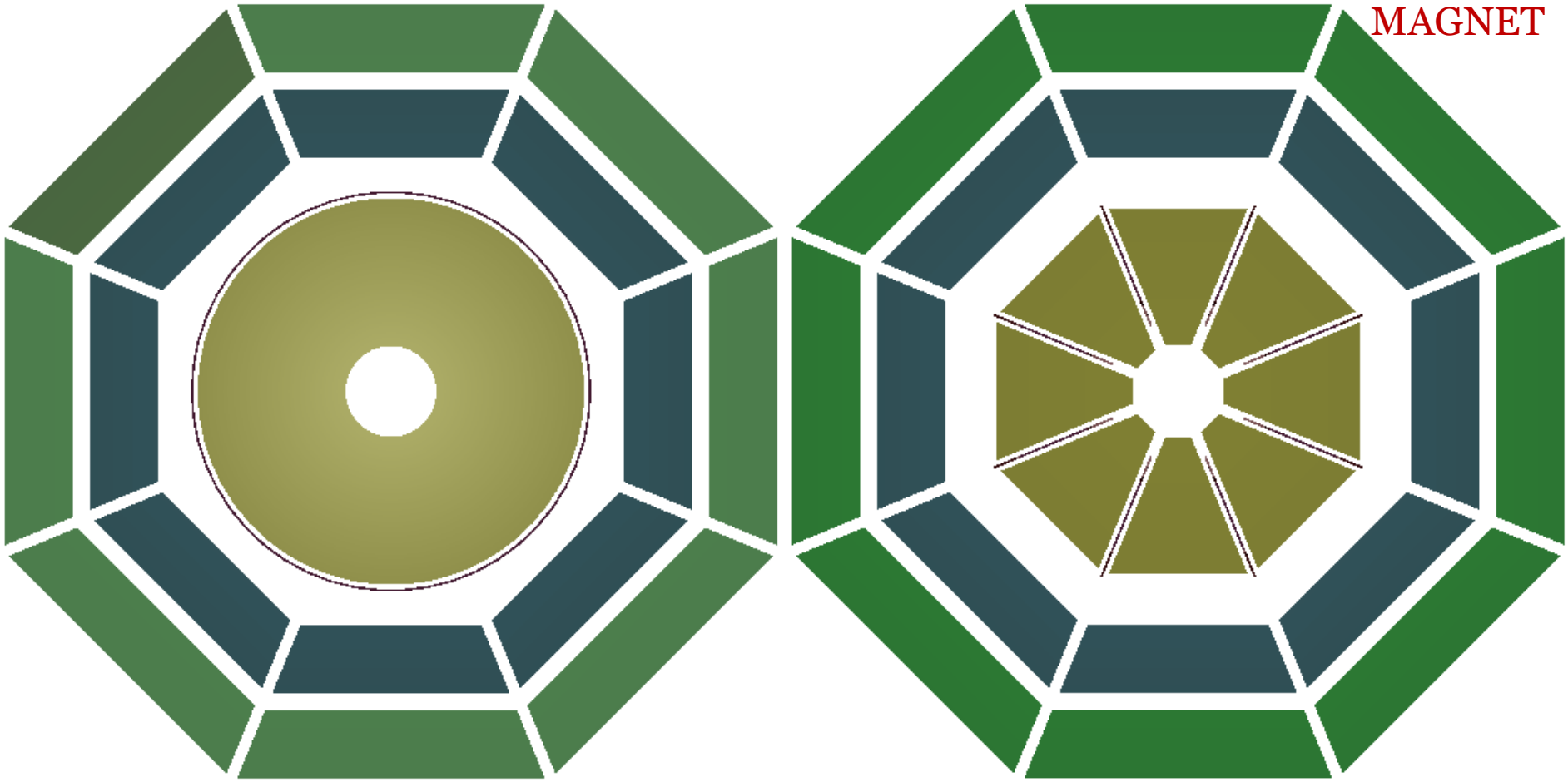


Geometry: R-Phi

Solenoidal part

Toroidal part

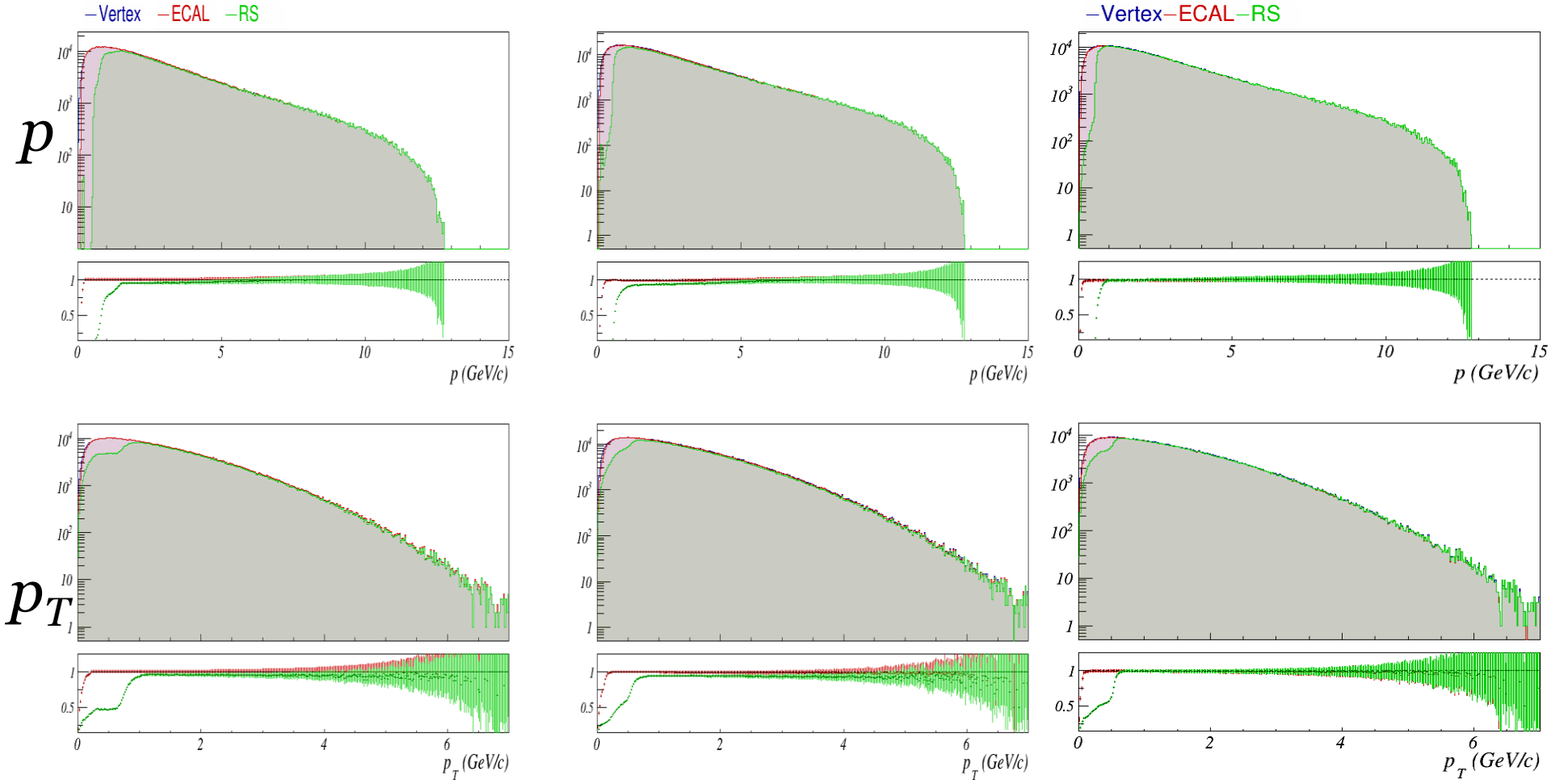
RS
ECAL
TS
MAGNET



Particles distributions

Solenoid vs Toroid vs Hybrid: μ^+

Solenoid | **Toroid** | **Hybrid**

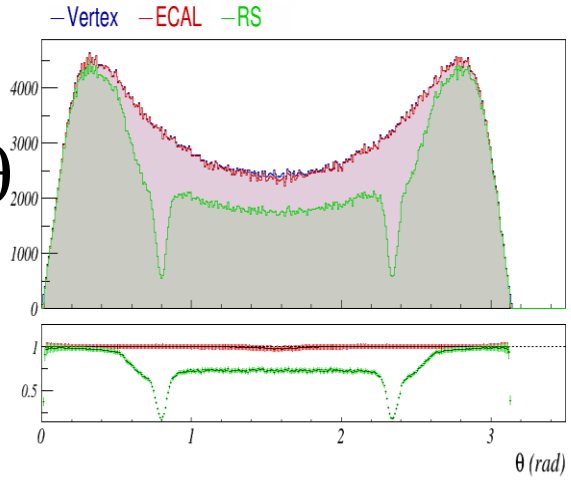


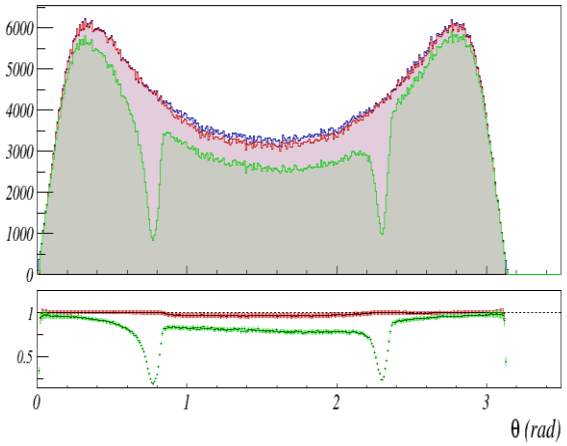
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	**99.31**	98.19	98.16
RS	78.00	82.31	**87.21**

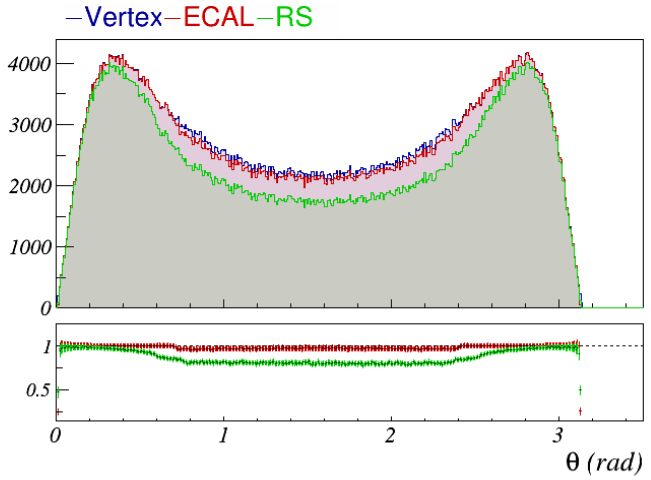
Solenoid vs Toroid vs Hybrid: μ^+

Solenoid **Toroid** **Hybrid**

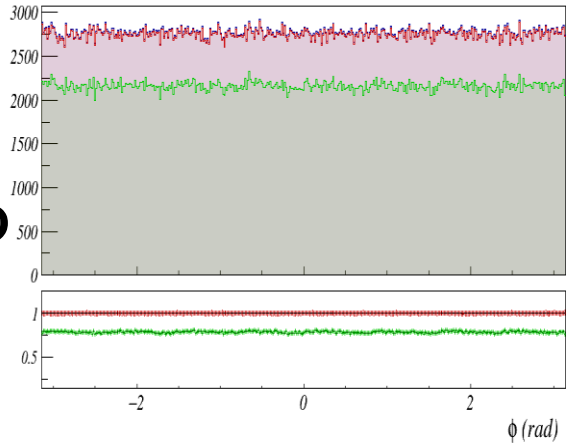
θ

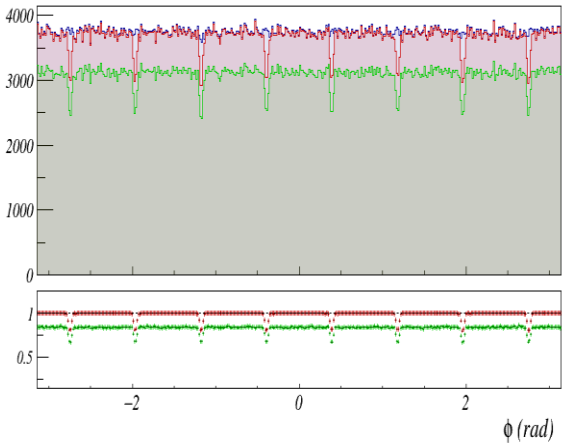


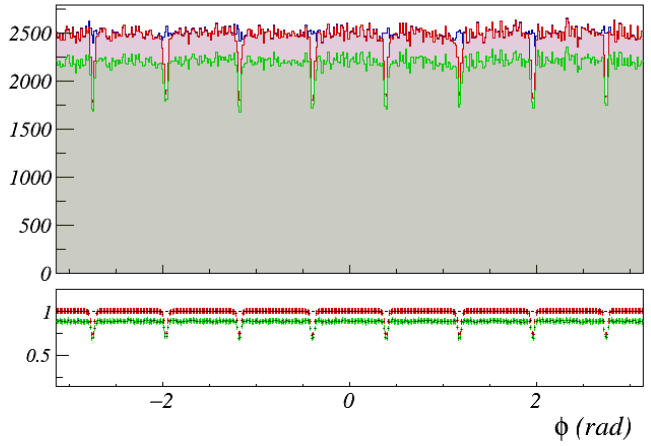




φ



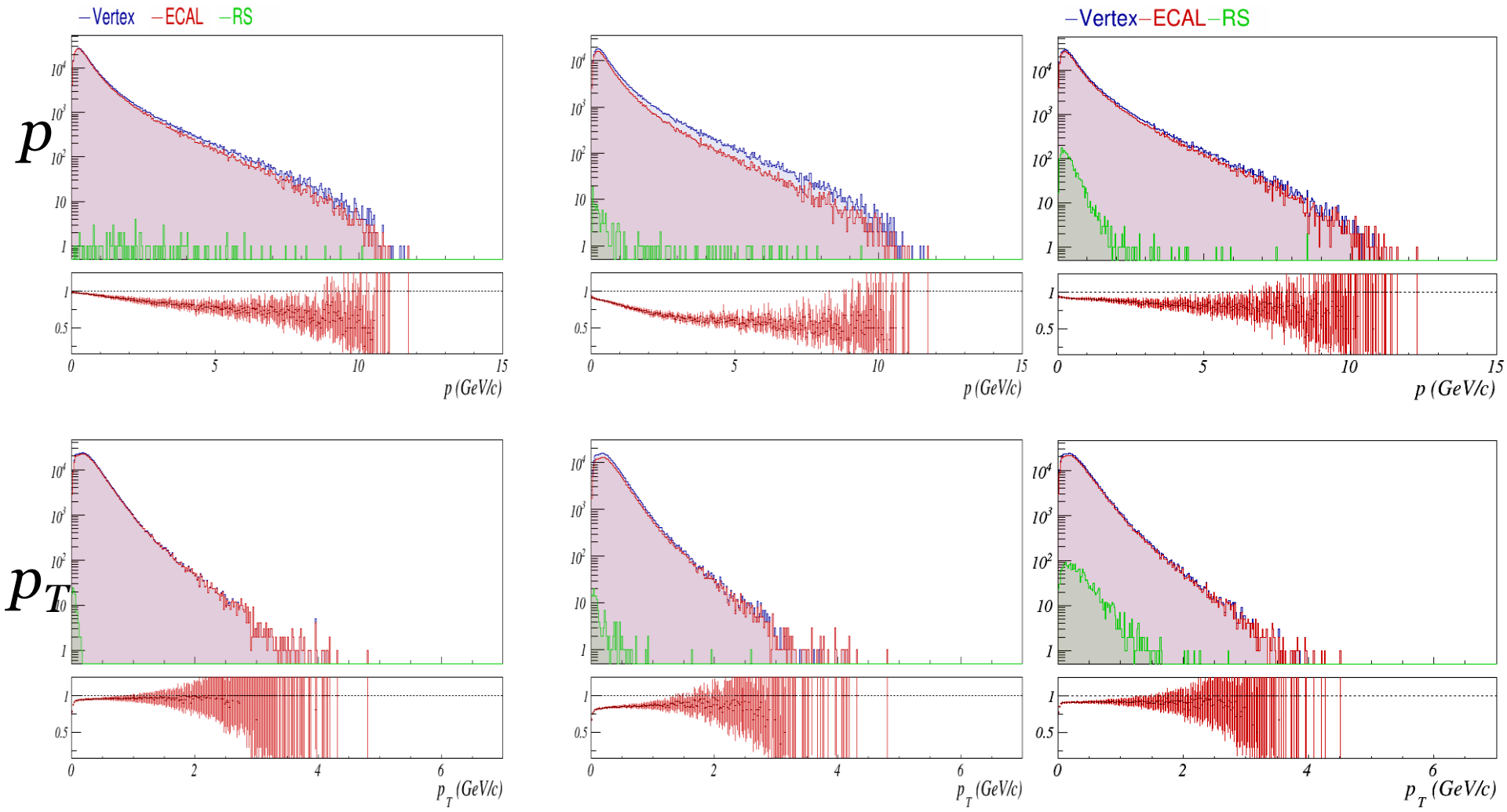




Detector	Solenoid %	Toroid %	Hybrid %
ECAL	**99.31**	98.19	98.16
RS	78.00	82.31	**87.21**

Solenoid vs Toroid vs Hybrid: γ

Solenoid **Toroid** **Hybrid**

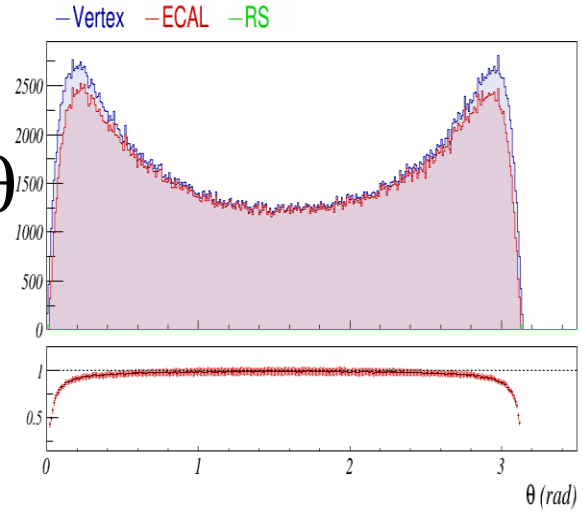


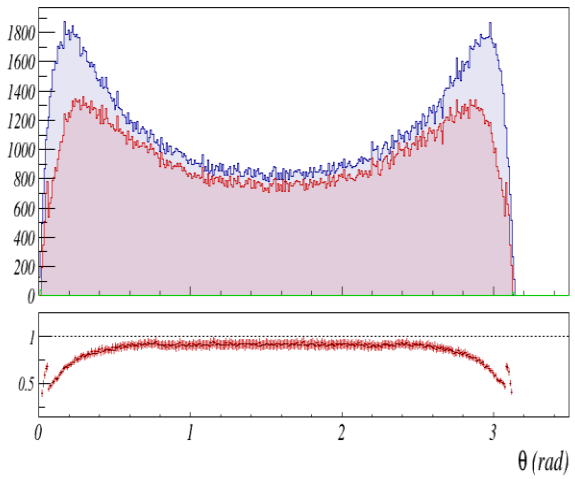
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	**94.3**	82.7	90.4

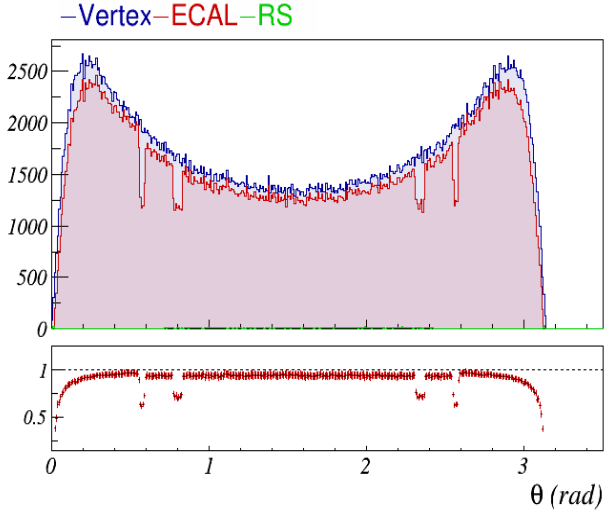
Solenoid vs Toroid vs Hybrid: γ

Solenoid **Toroid** **Hybrid**

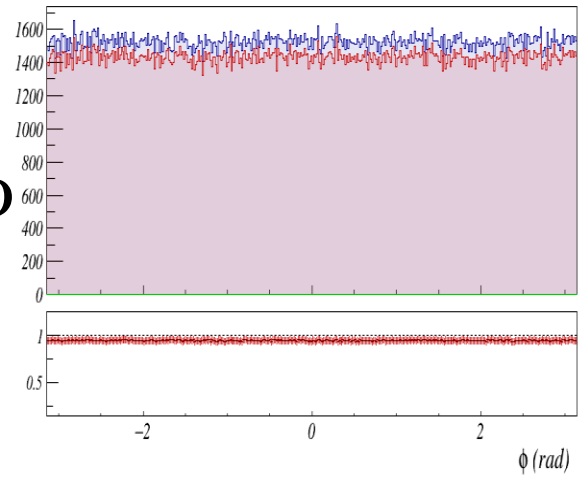
θ

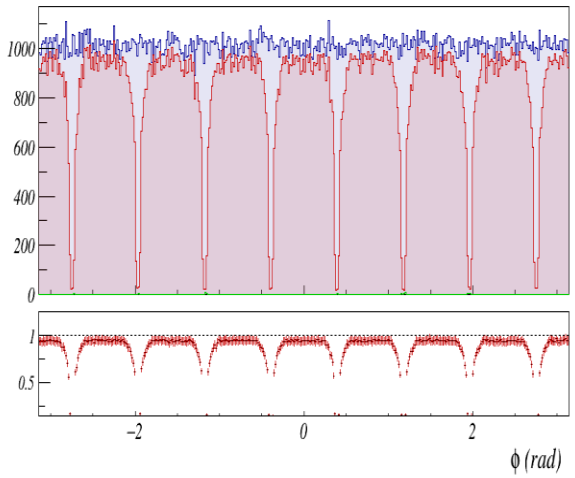


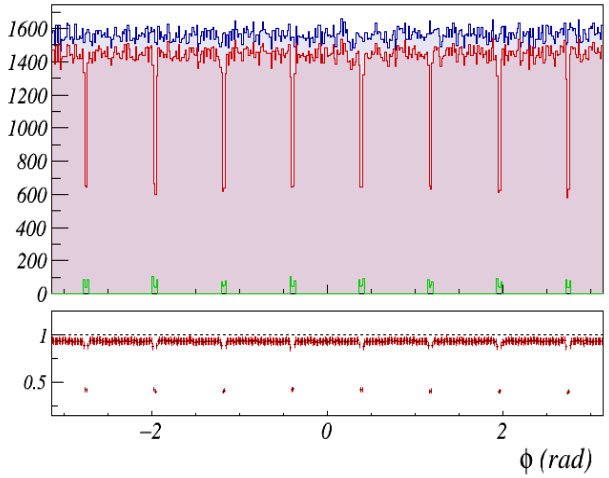




φ

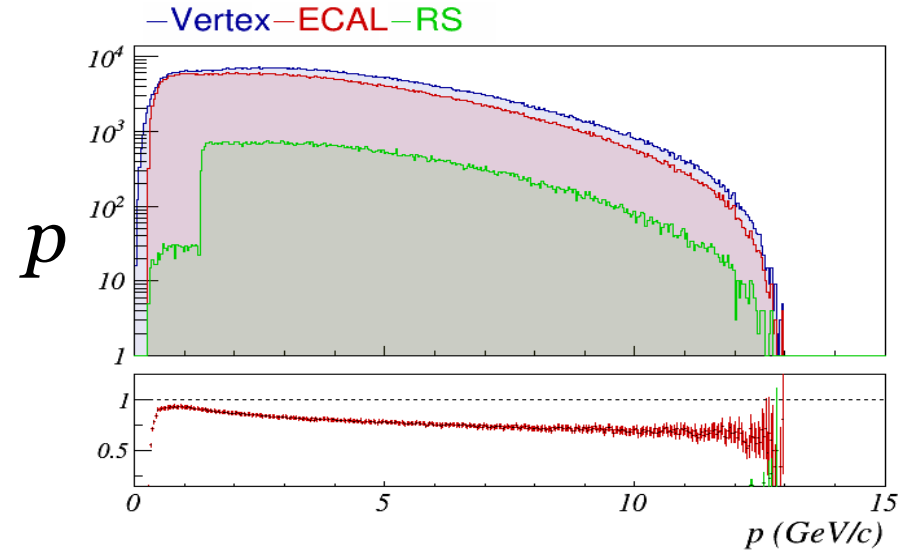


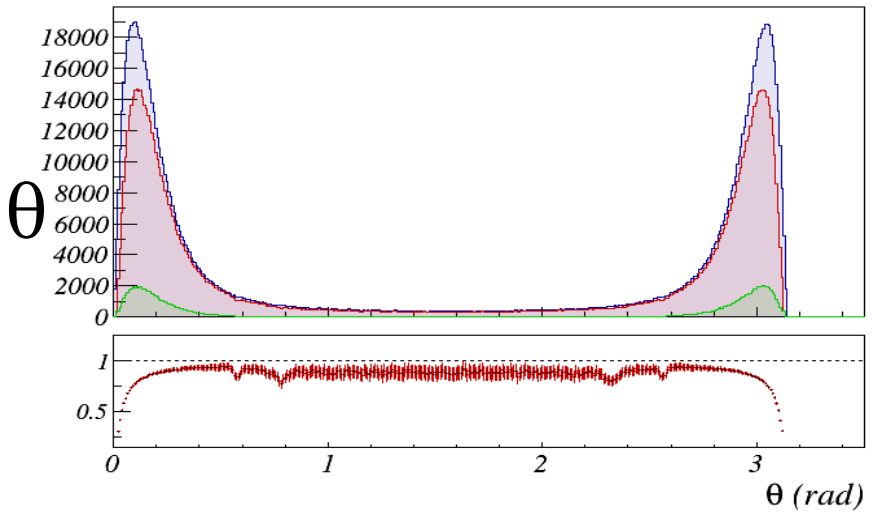


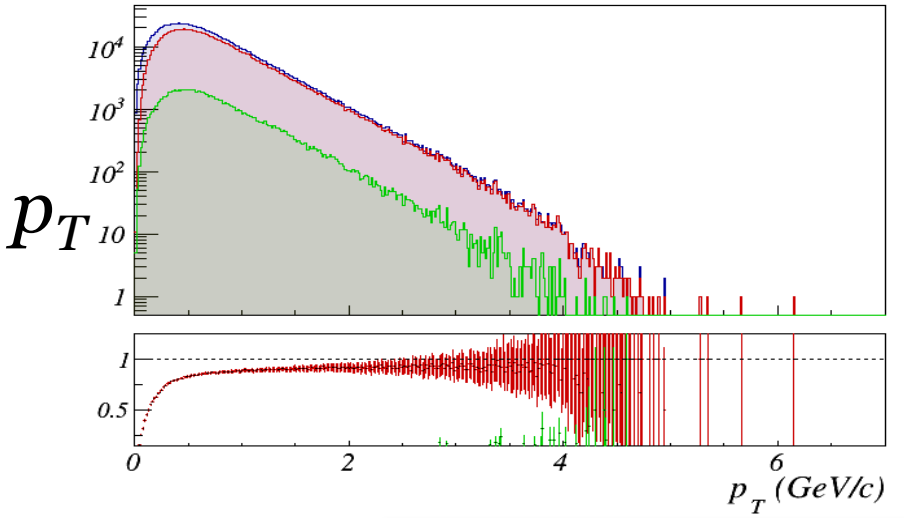


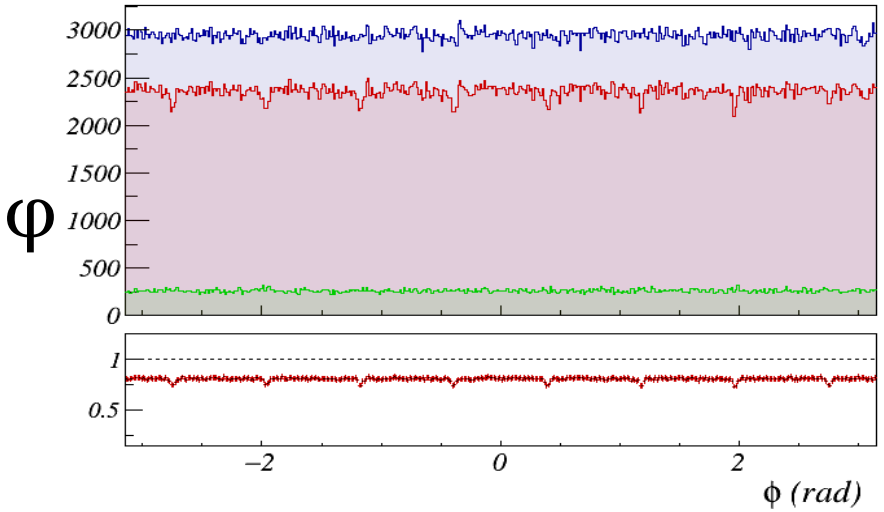
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	**94.3**	82.7	90.4

Hybrid: p



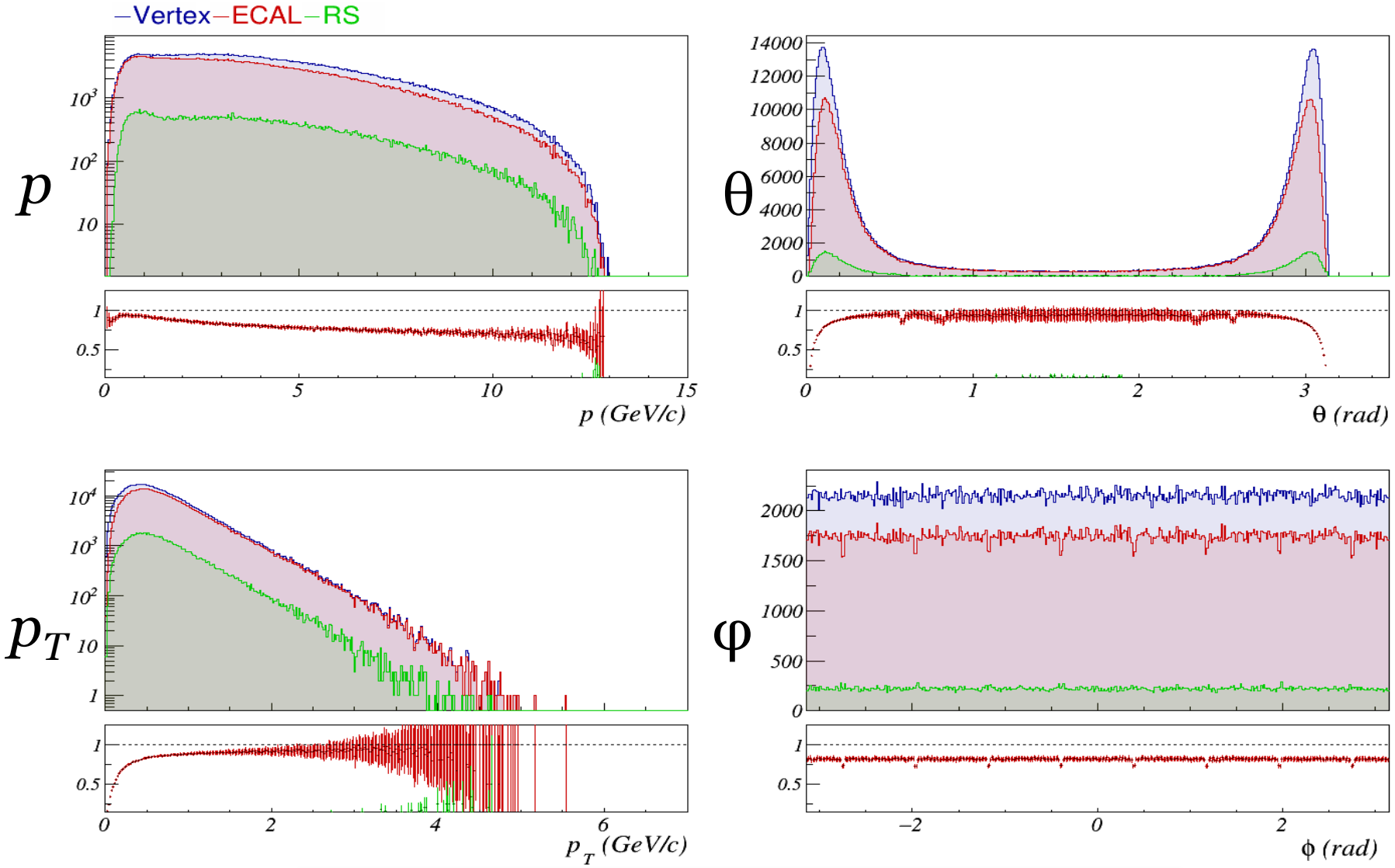






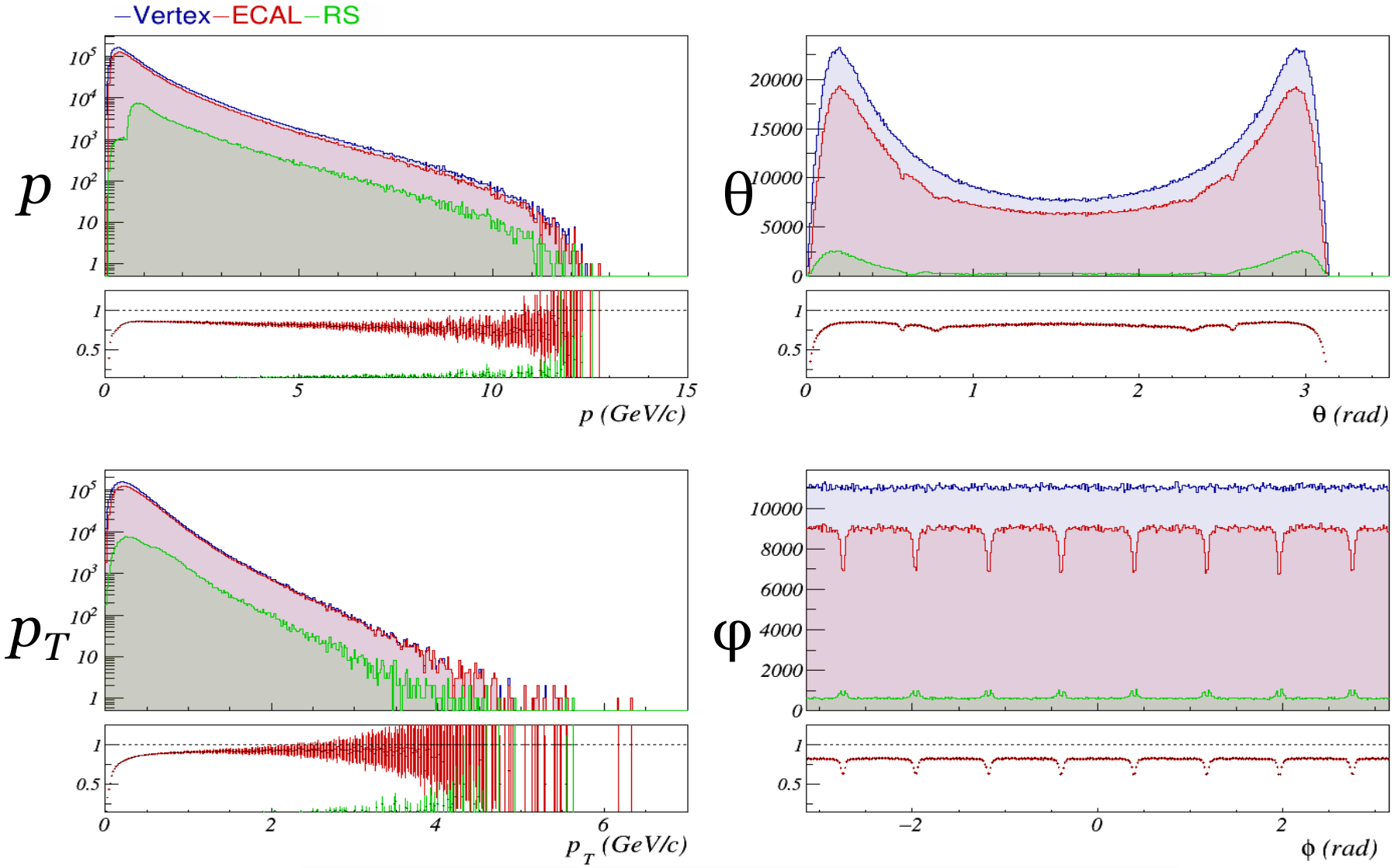
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	55.48	48.54	**79.97**

Hybrid: n



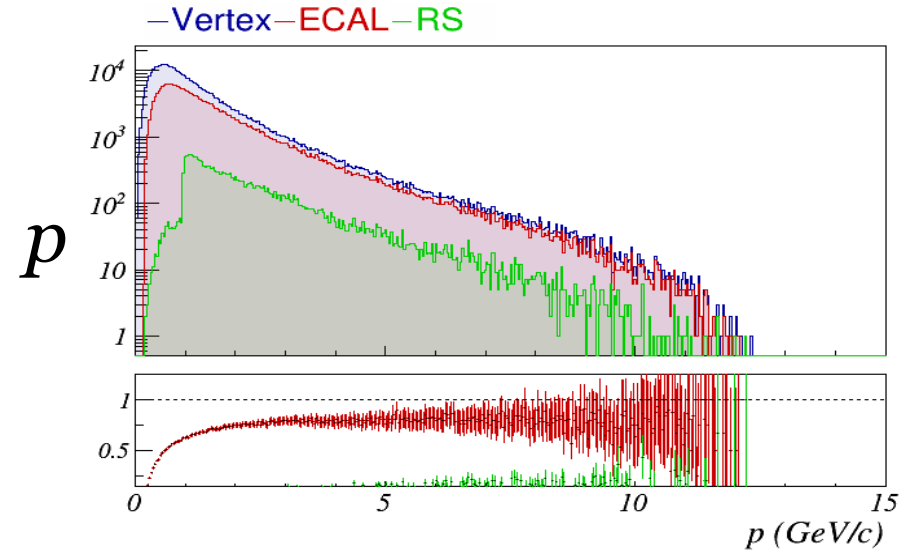
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	77.01	65.82	**81.00**

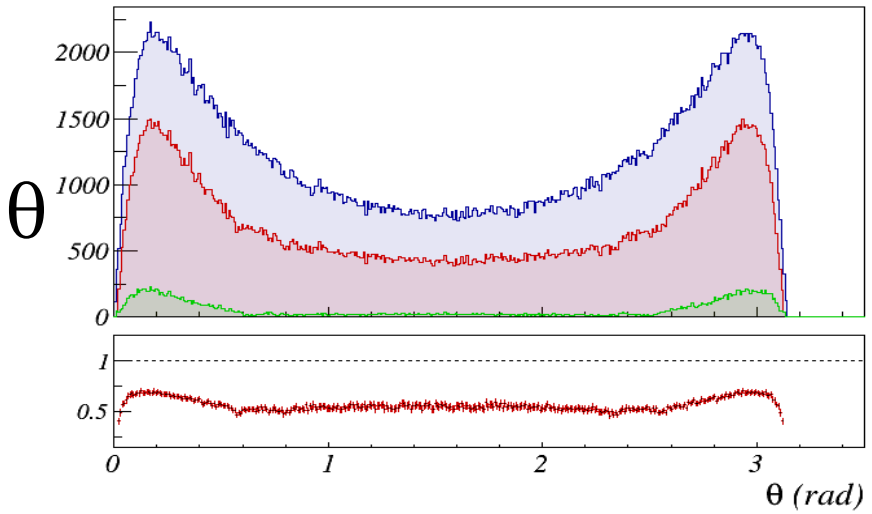
Hybrid: π^+

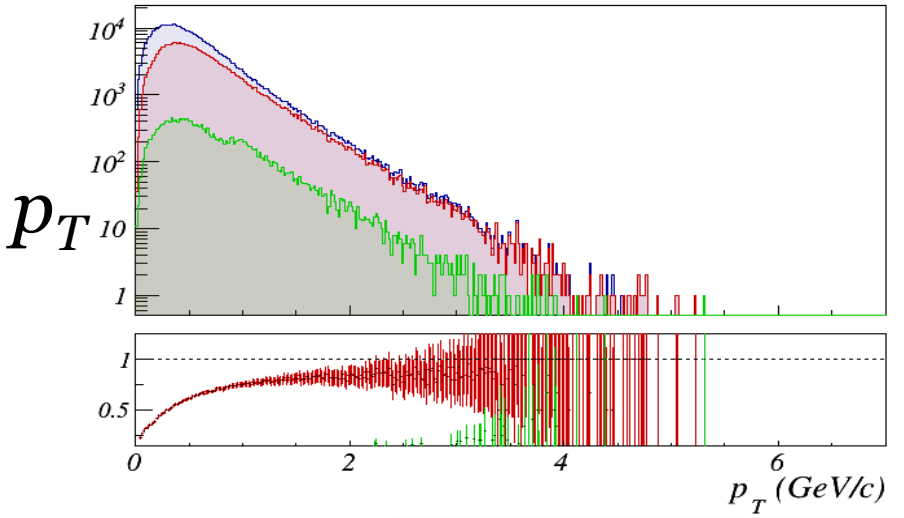


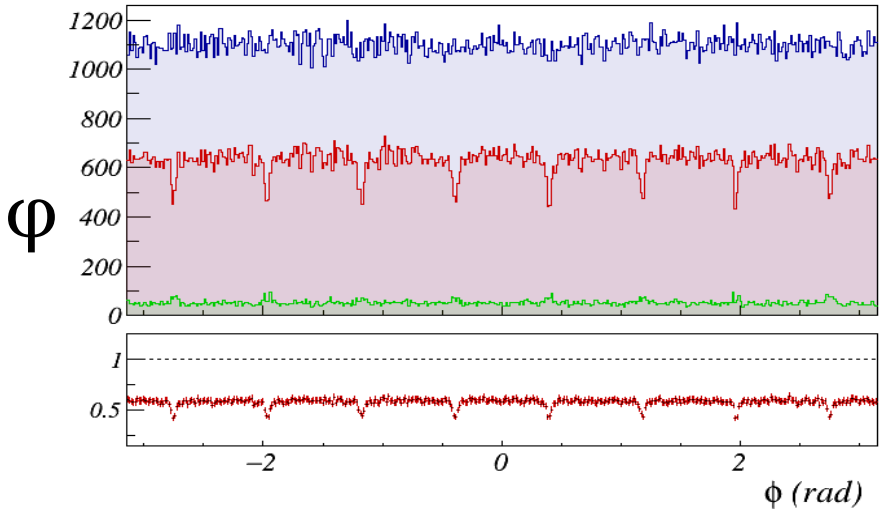
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	79.74	71.86	**80.12**

Hybrid: K^+



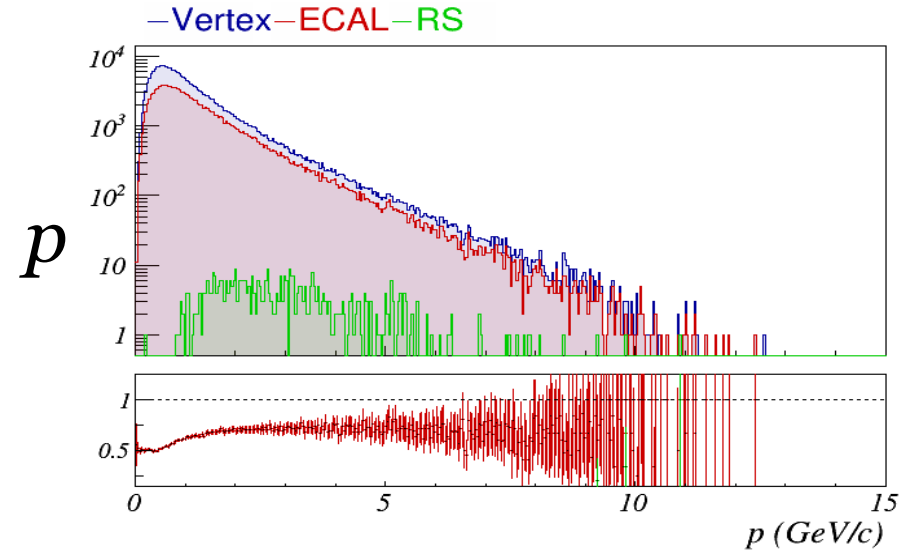


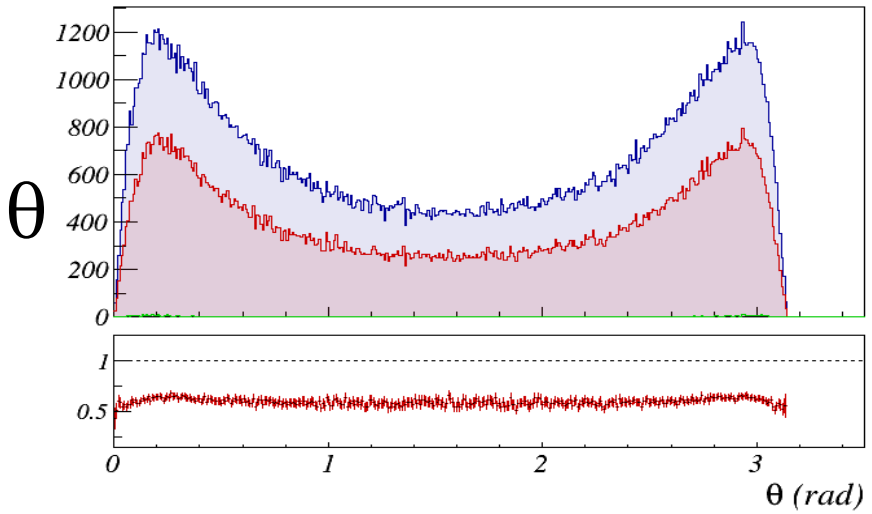


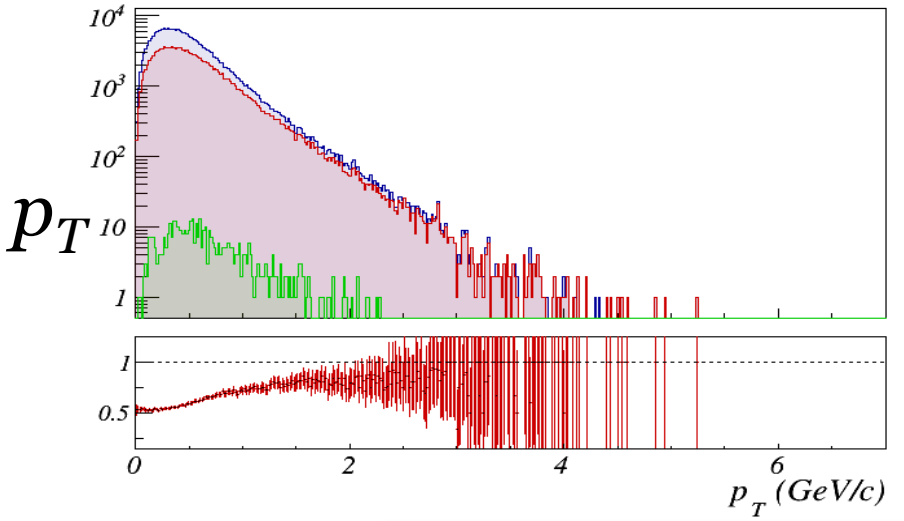


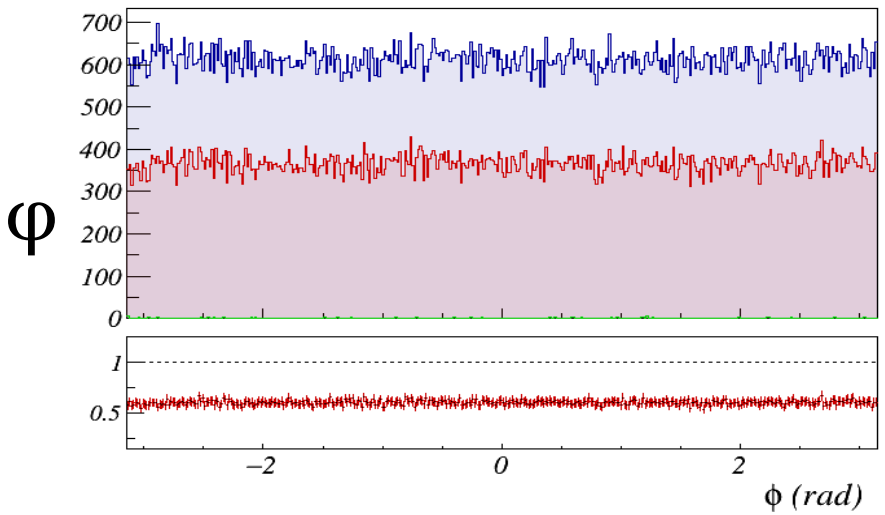
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	**63.60**	53.46	57.36

Hybrid: $K^0 \rightarrow \pi^+\pi^-$



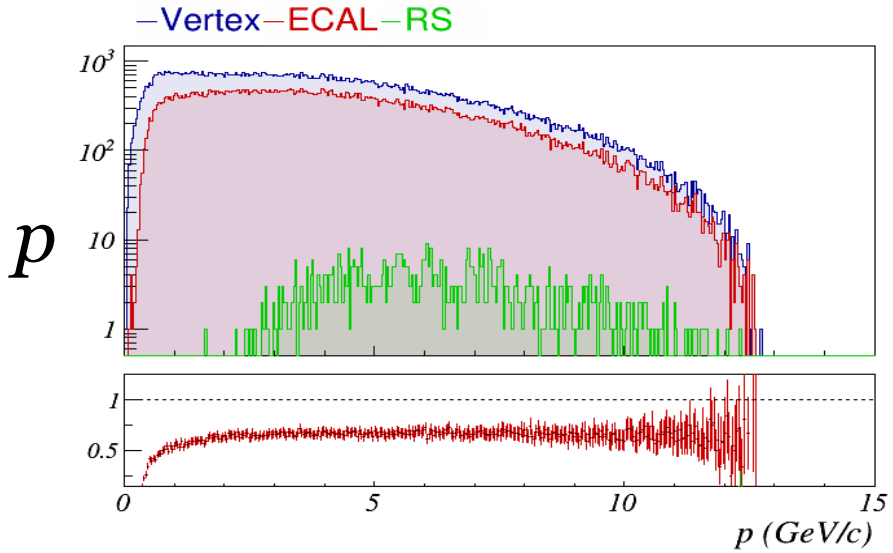


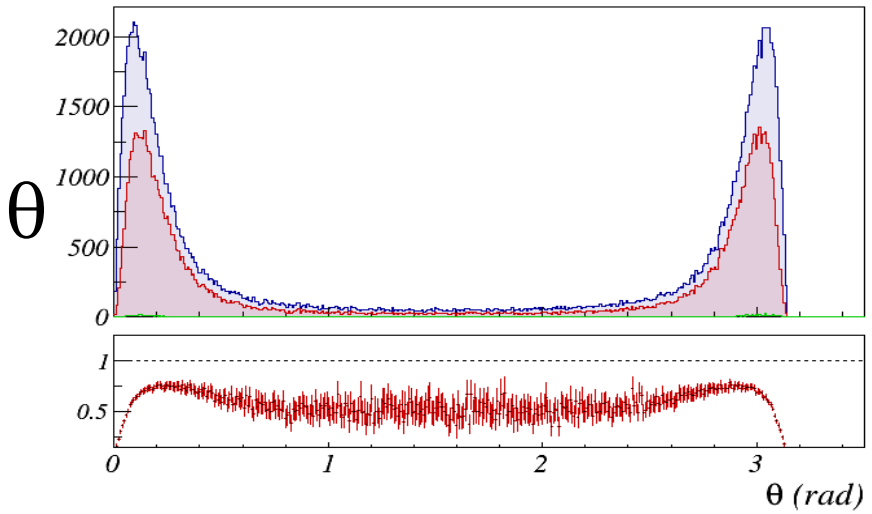


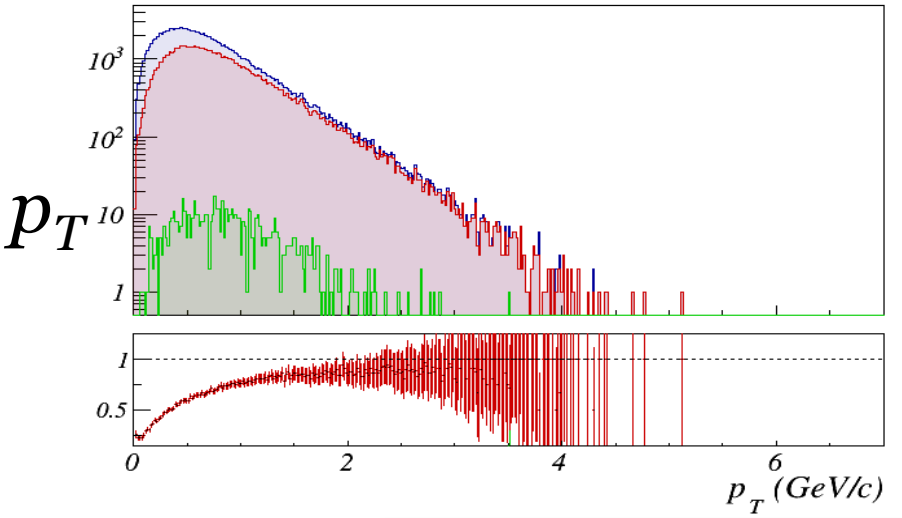


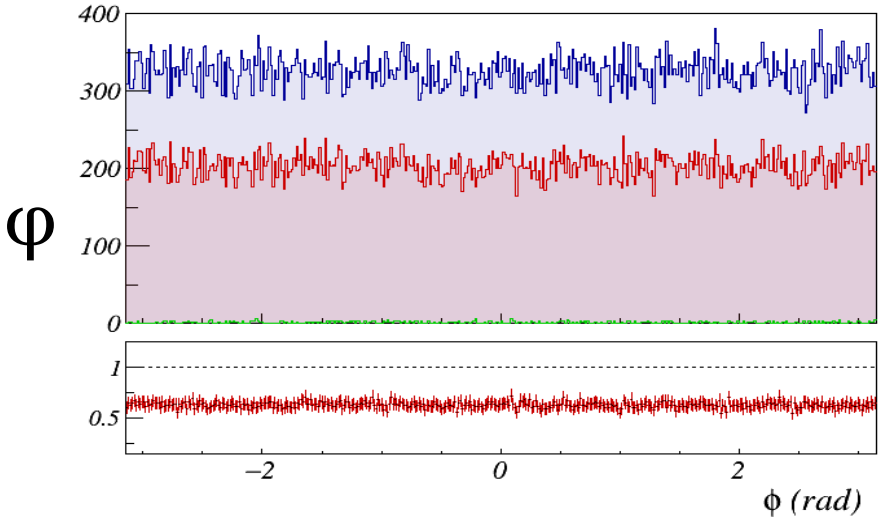
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	55.92	46.41	**59.75**

Hybrid: $\Lambda \rightarrow p\pi^-$









Detector	Solenoid %	Toroid %	Hybrid %
ECAL	58.59	39.80	**62.34**

Conclusion

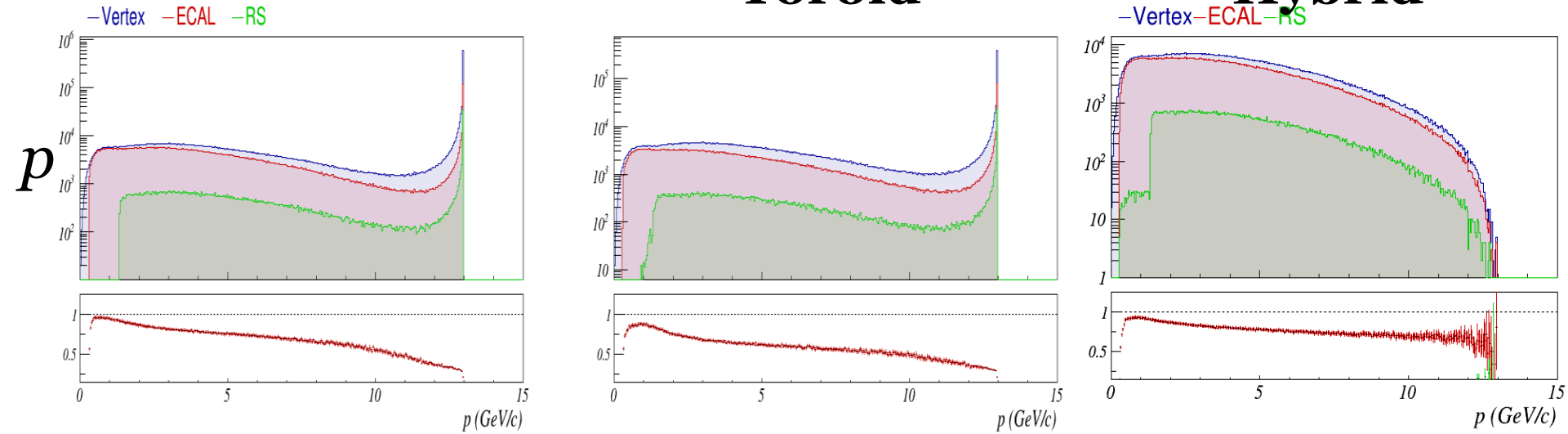
Particles	Solenoid %	Toroid %	Hybrid %
γ	94.3 (ECAL)	82.7 (ECAL)	90.4 (ECAL)
$\pi^0 \rightarrow \gamma\gamma$	88.2 (ECAL)	79.5 (ECAL)	82.4 (ECAL)
p	55.48 (ECAL)	48.54 (ECAL)	79.97 (ECAL)
n	77.01 (ECAL)	65.82 (ECAL)	81.00 (ECAL)
$\pi^{\pm}$	79.74 (ECAL)	71.86 (ECAL)	80.12 (ECAL)
$K^{\pm}$	63.60 (ECAL)	53.46 (ECAL)	57.36 (ECAL)
$\mu^{\pm}$	78.00 (RS)	82.31 (RS)	98.16 (RS)
$\Lambda \rightarrow p\pi^-$	58.59 (ECAL)	39.80 (ECAL)	62.34 (ECAL)
$K^0 \rightarrow \pi^+\pi^-$	55.92 (ECAL)	46.41 (ECAL)	59.75 (ECAL)

Additional materials

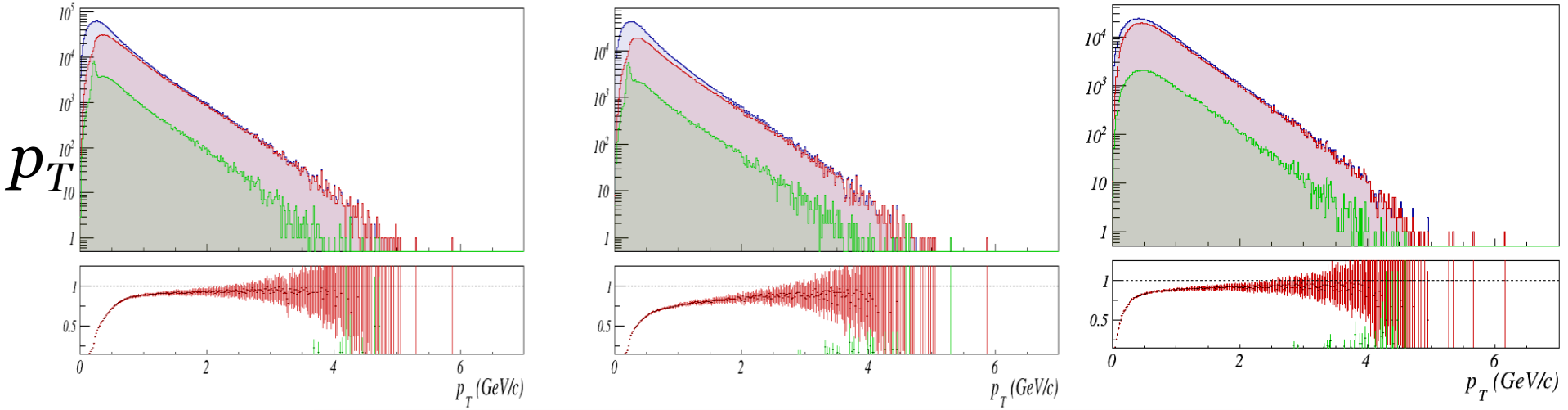
Solenoid vs Toroid vs Hybrid: p

Solenoid | **Toroid** | **Hybrid**

p



p_T

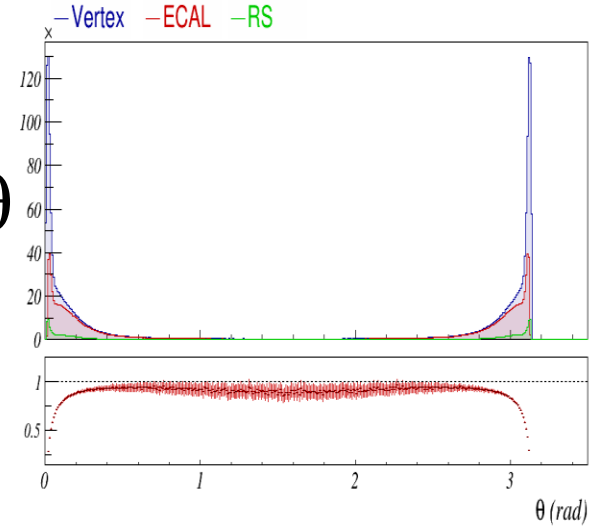


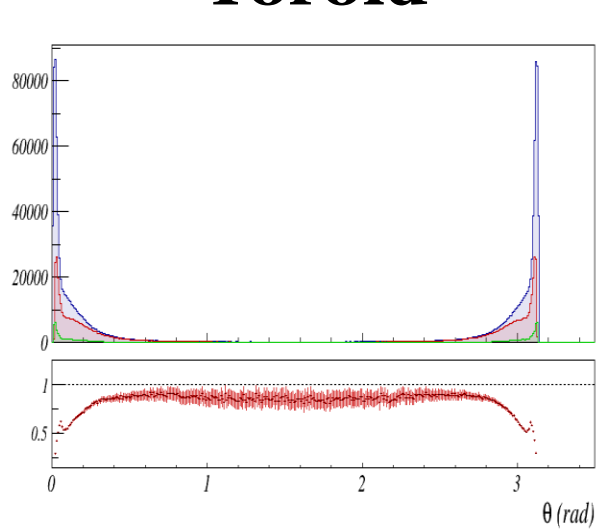
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	55.48	48.54	**79.97**

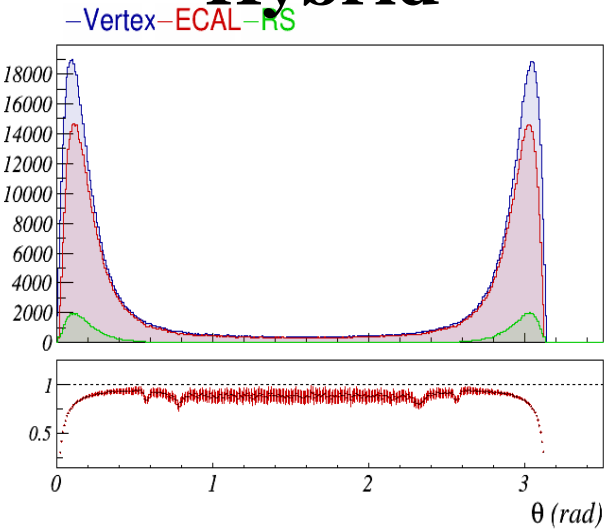
Solenoid vs Toroid vs Hybrid: p

Solenoid **Toroid** **Hybrid**

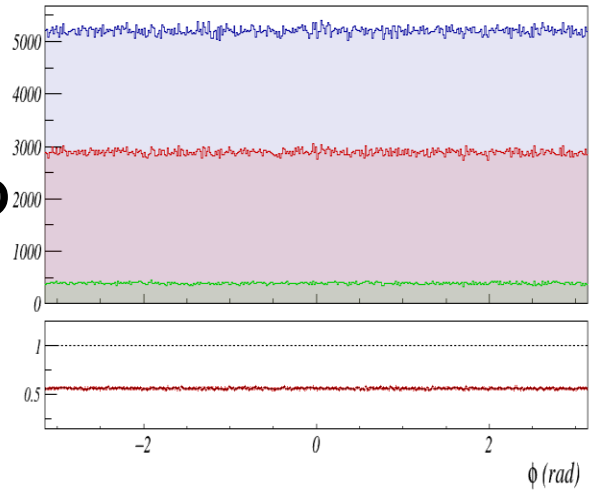
θ

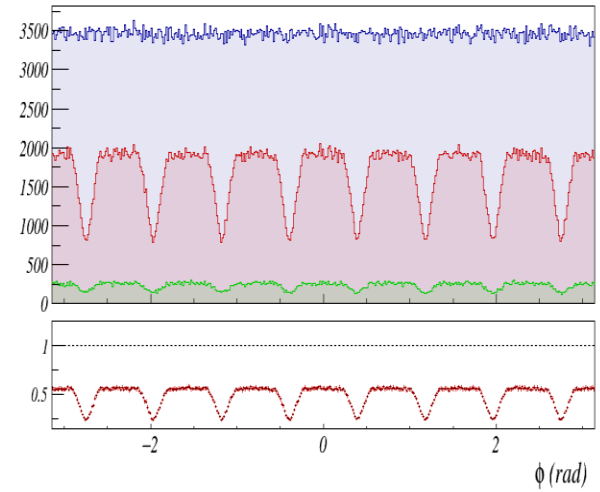


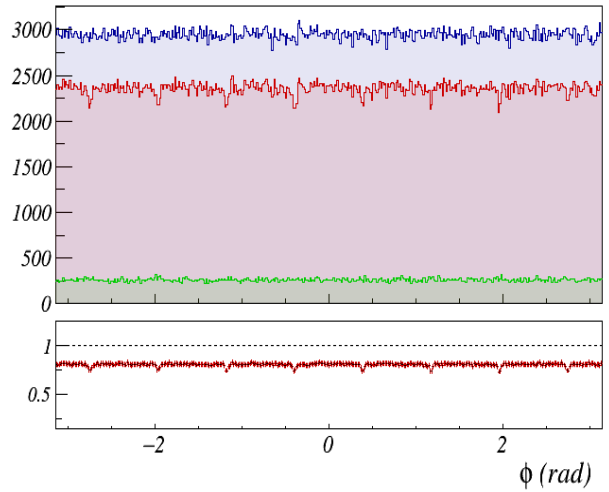




φ





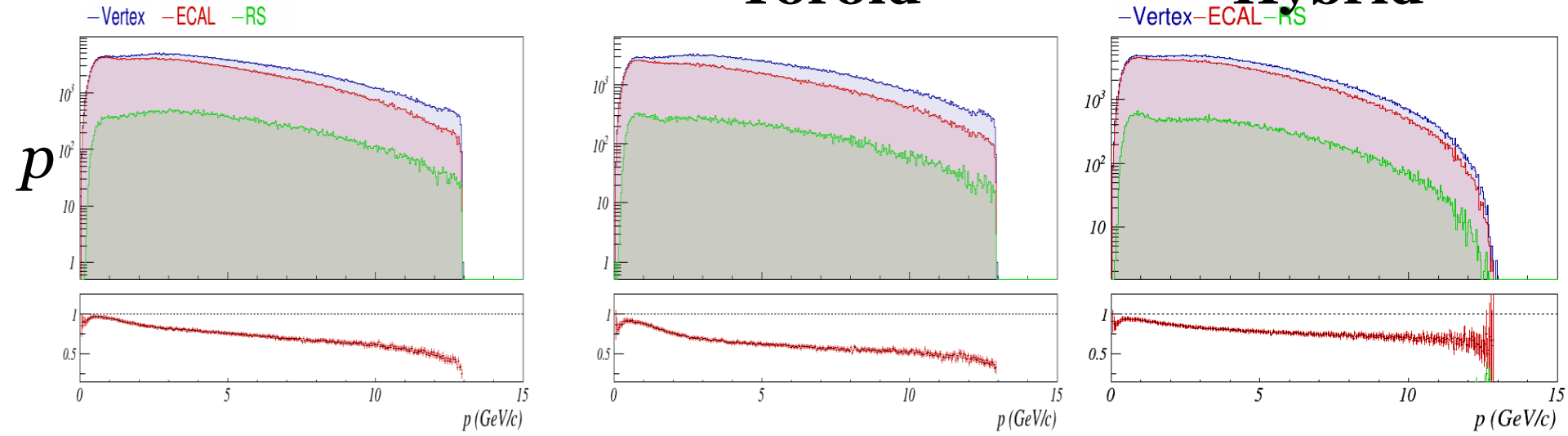


Detector	Solenoid %	Toroid %	Hybrid %
ECAL	55.48	48.54	**79.97**

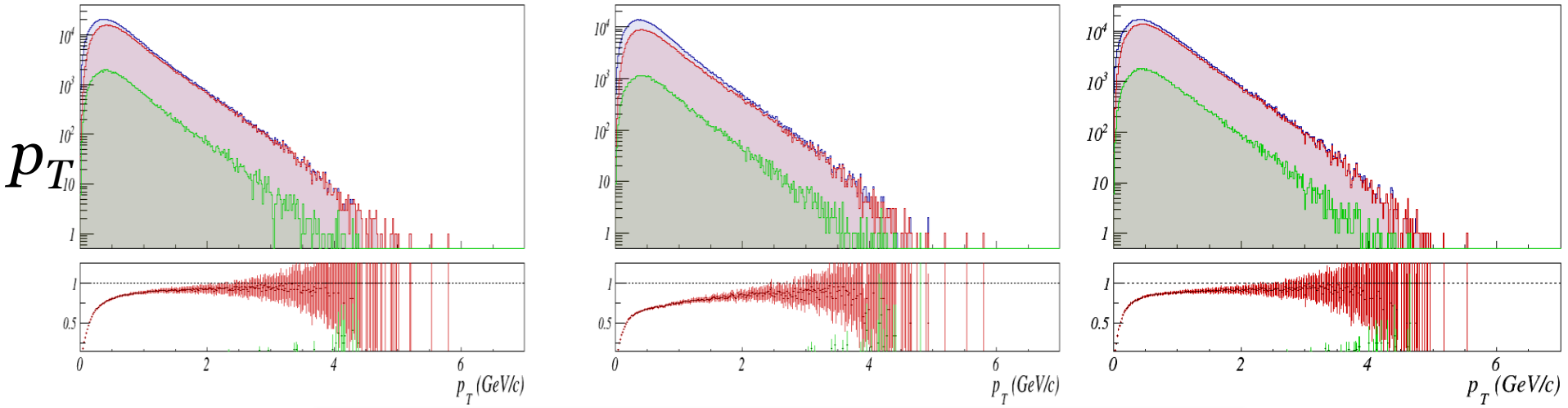
Solenoid vs Toroid vs Hybrid: n

Solenoid | **Toroid** | **Hybrid**

p



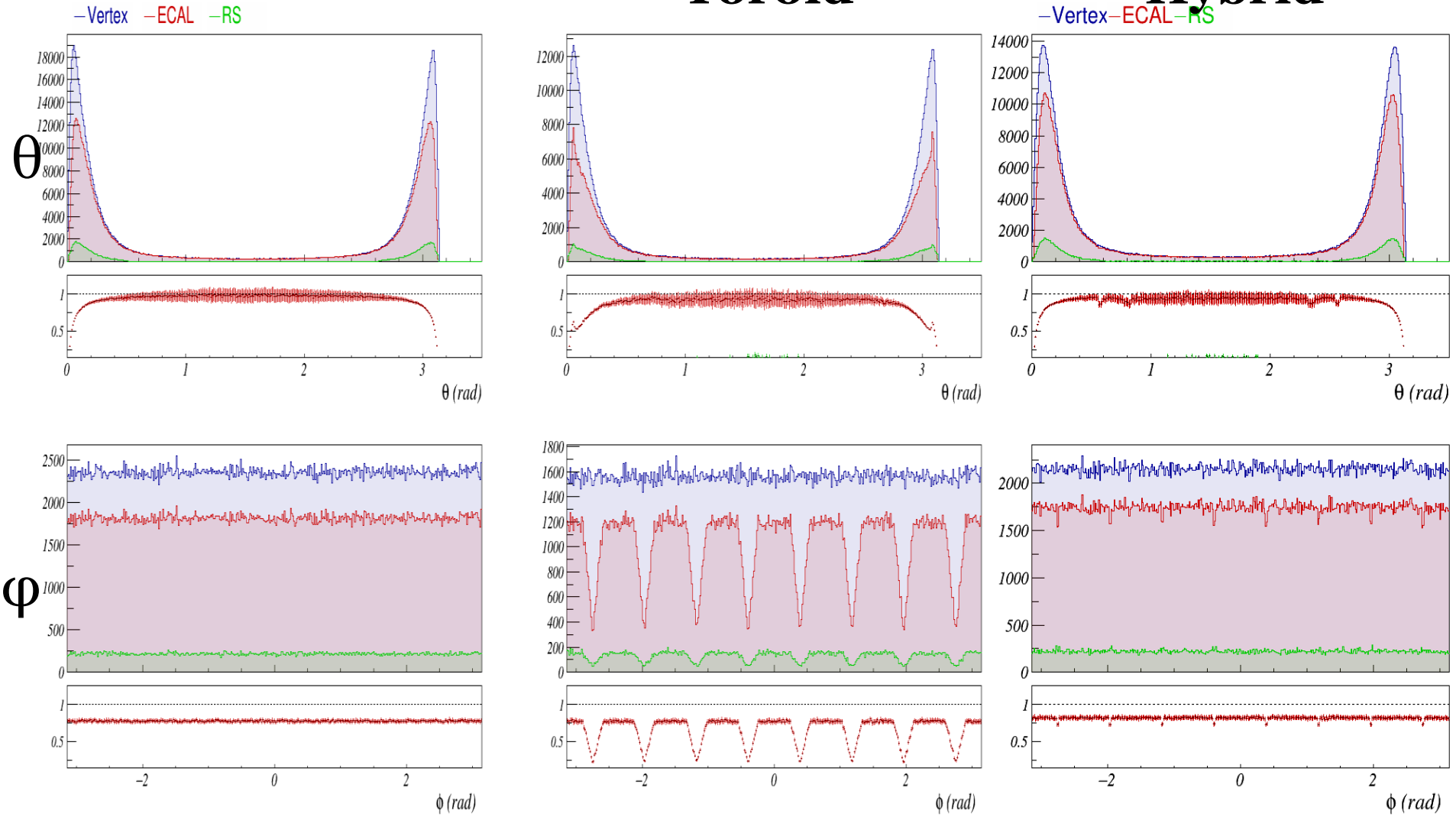
p_T



Detector	Solenoid %	Toroid %	Hybrid %
ECAL	77.01	65.82	**81.00**

Solenoid vs Toroid vs Hybrid: n

Solenoid **Toroid** **Hybrid**

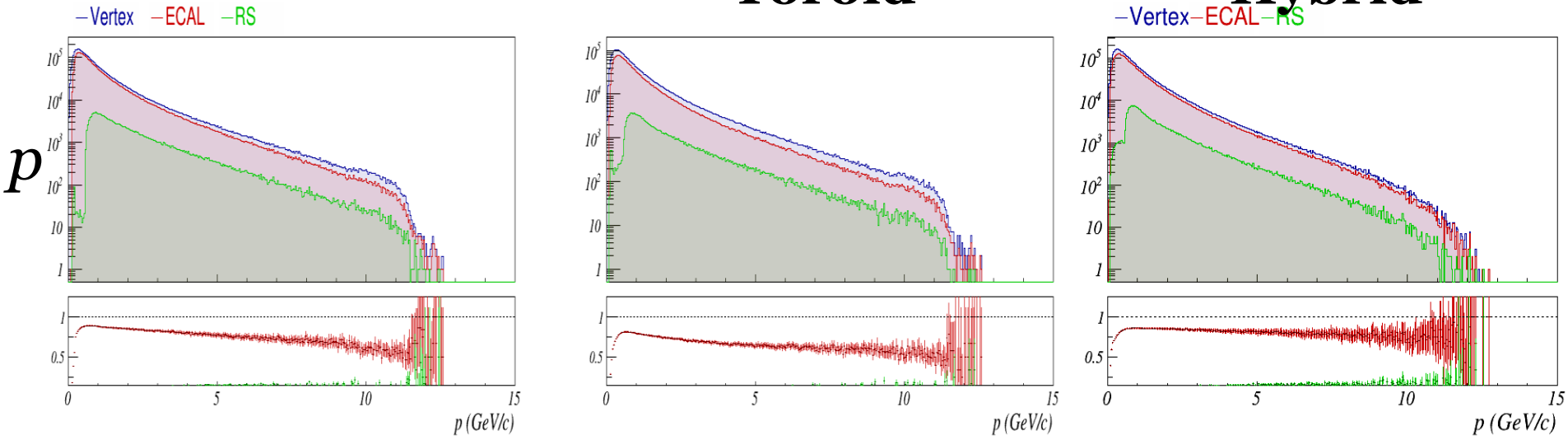


Detector	Solenoid %	Toroid %	Hybrid %
ECAL	77.01	65.82	**81.00**

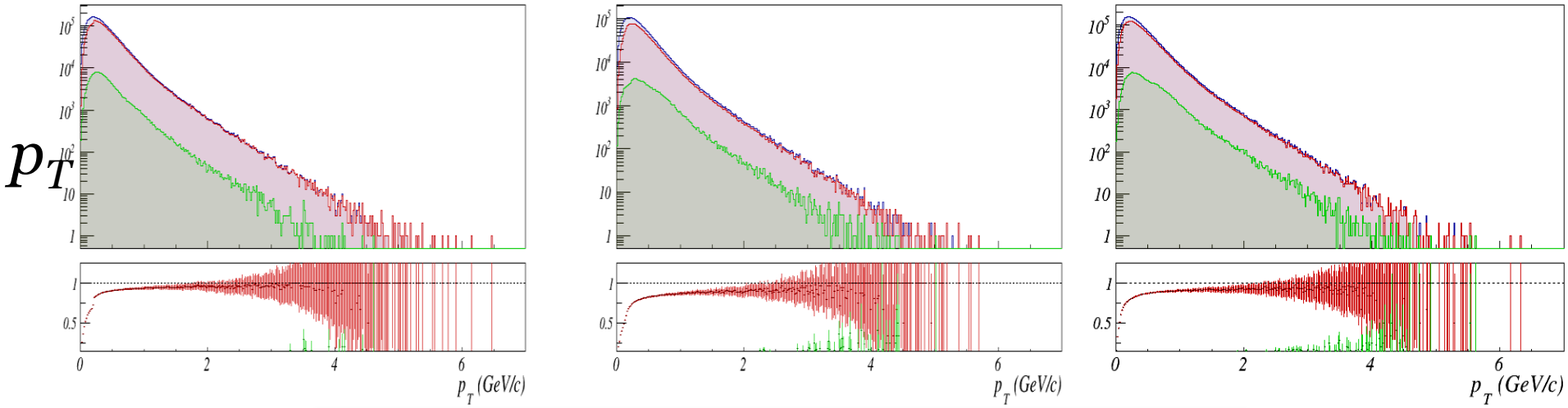
Solenoid vs Toroid vs Hybrid: π^+

Solenoid | **Toroid** | **Hybrid**

p



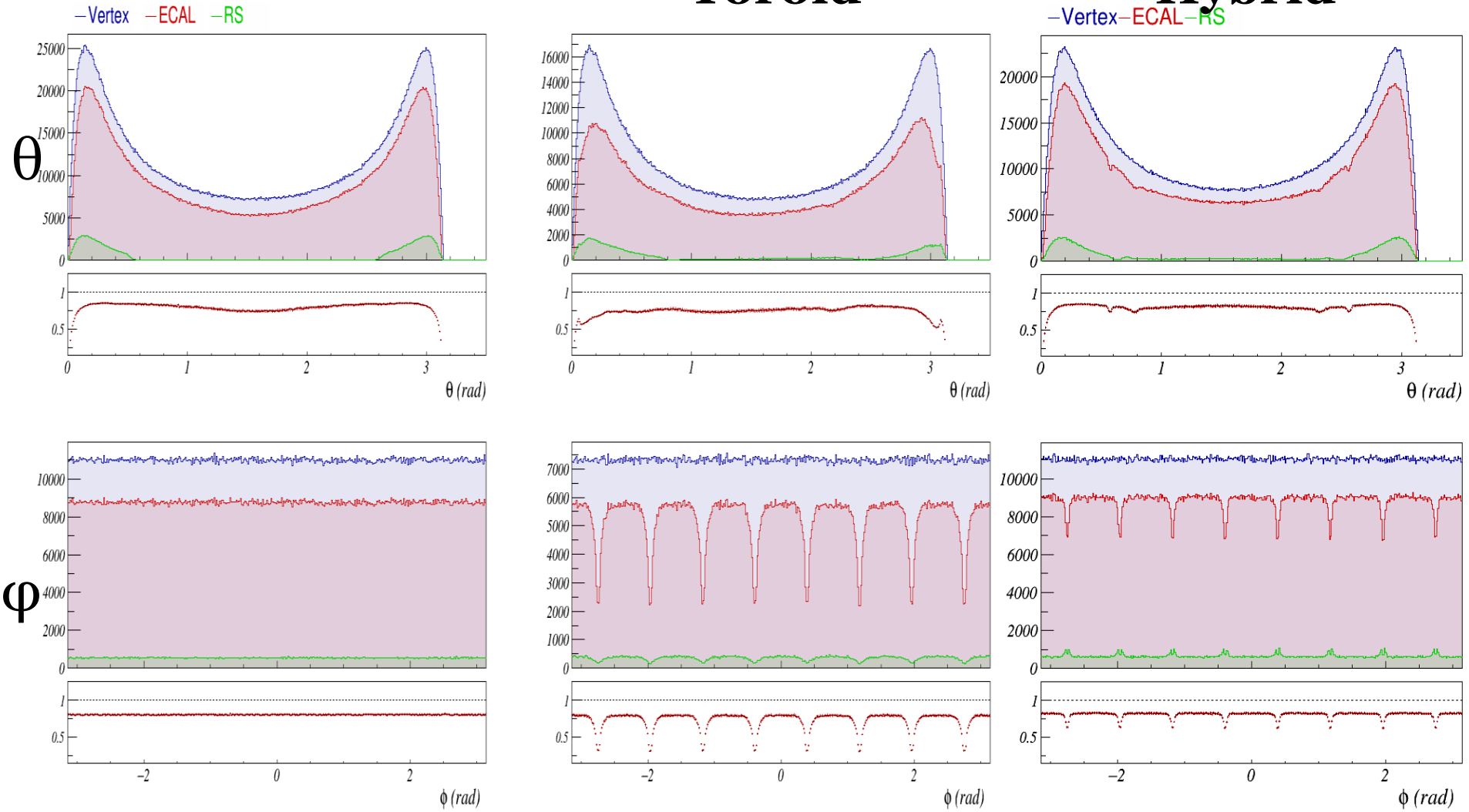
p_T



Detector	Solenoid %	Toroid %	Hybrid %
ECAL	79.74	71.86	**80.12**

Solenoid vs Toroid vs Hybrid: π^+

Solenoid | **Toroid** | **Hybrid**

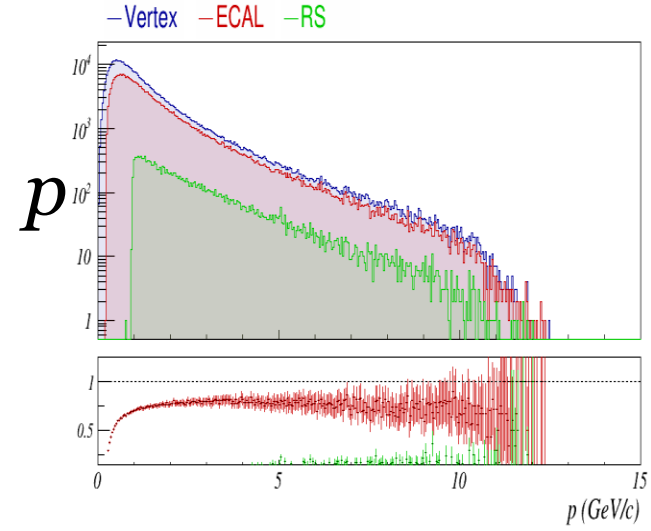


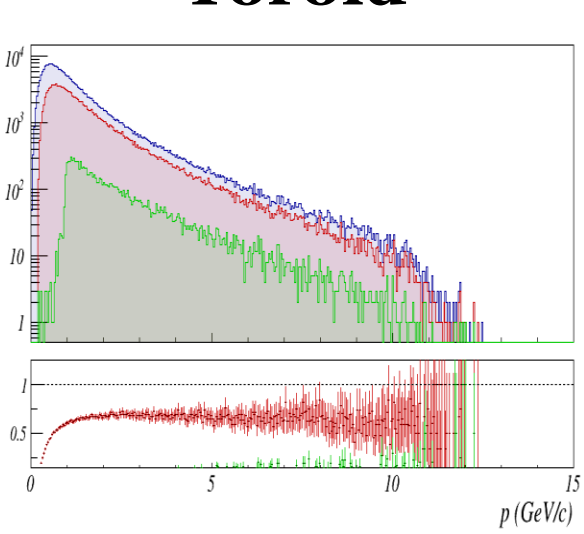
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	79.74	71.86	**80.12**

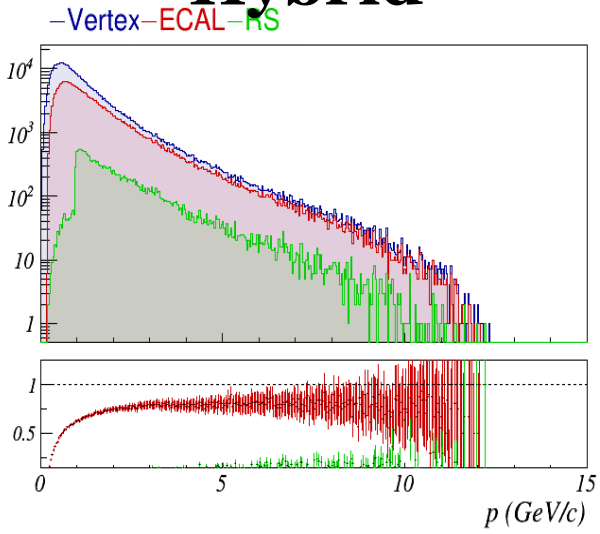
Solenoid vs Toroid vs Hybrid: K^+

Solenoid | **Toroid** | **Hybrid**

p







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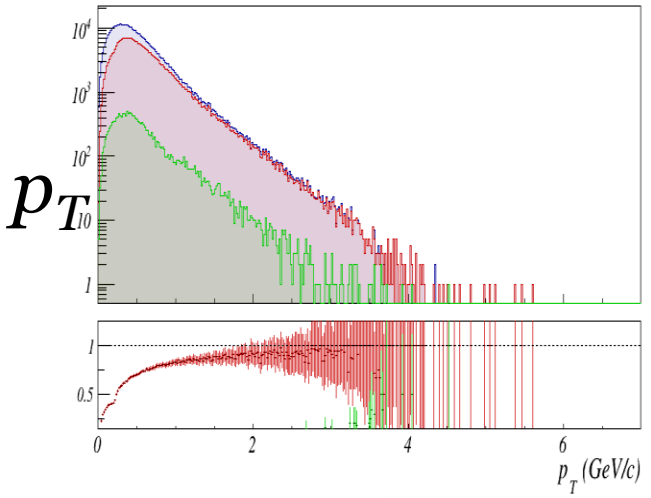
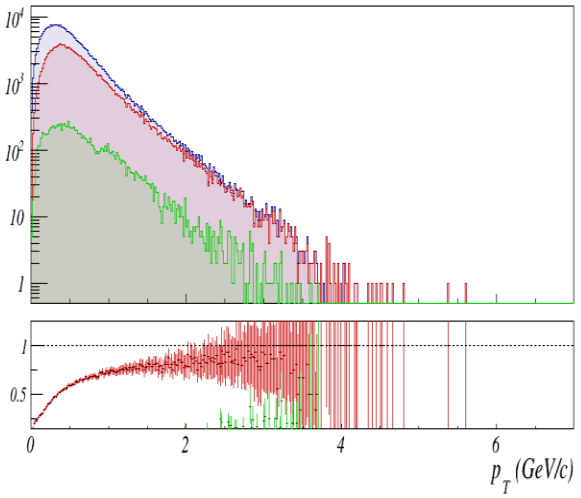
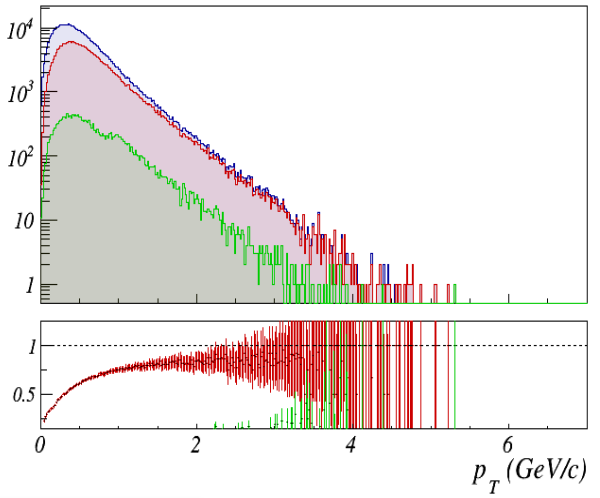


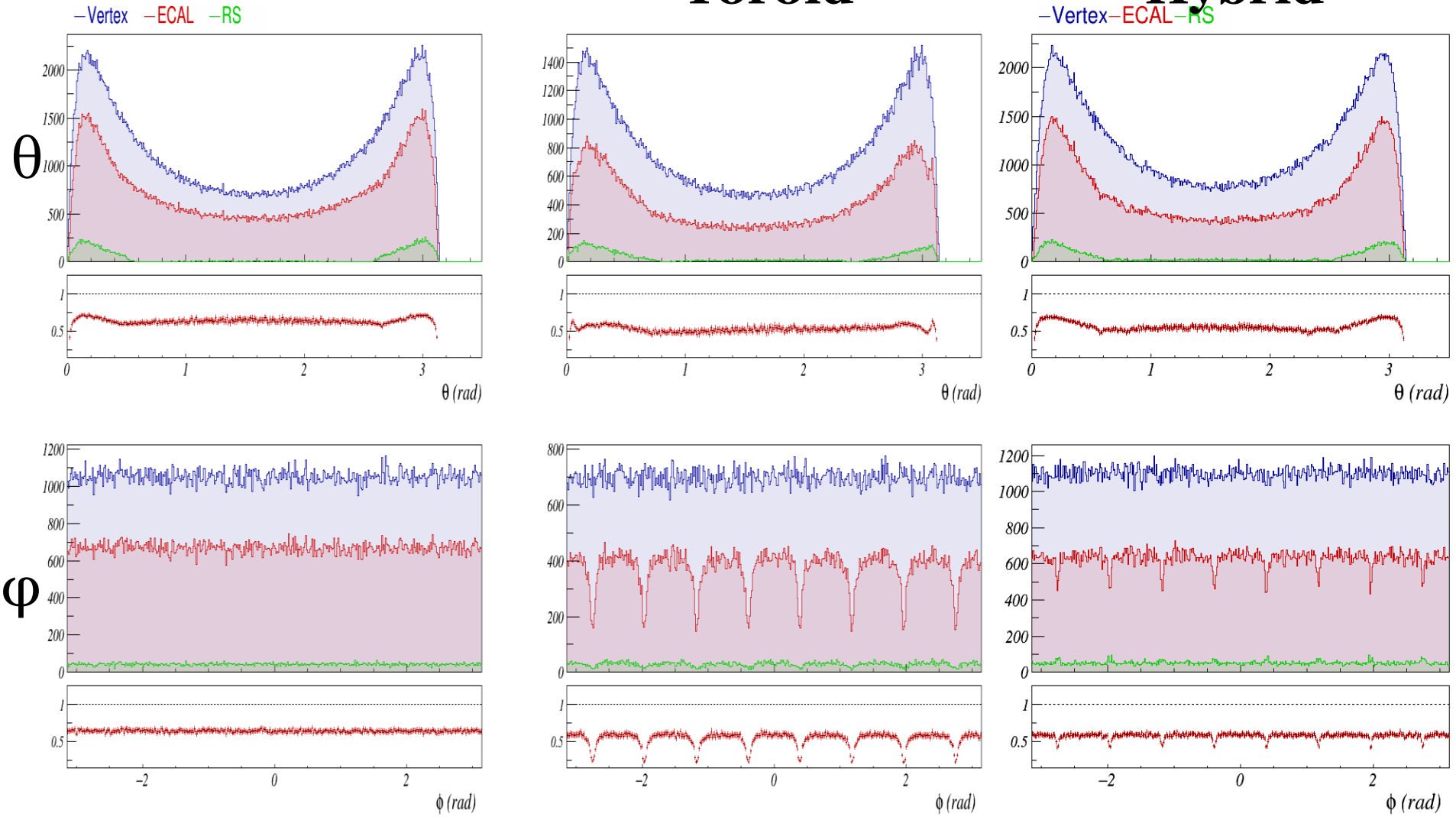




Detector	Solenoid %	Toroid %	Hybrid %
ECAL	**63.60**	53.46	57.36

Solenoid vs Toroid vs Hybrid: K^+

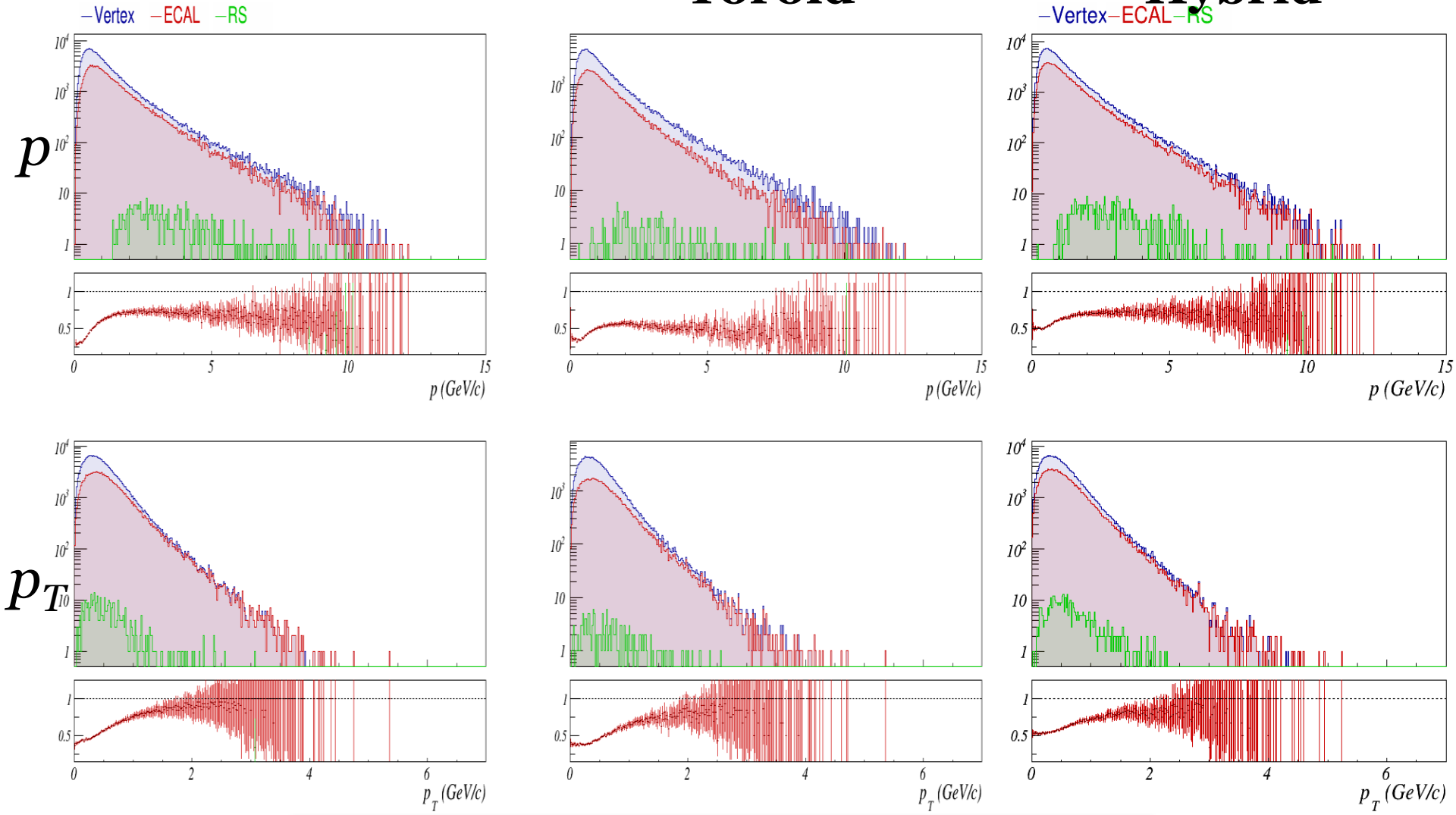
Solenoid **Toroid** **Hybrid**



Detector	Solenoid %	Toroid %	Hybrid %
ECAL	**63.60**	53.46	57.36

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

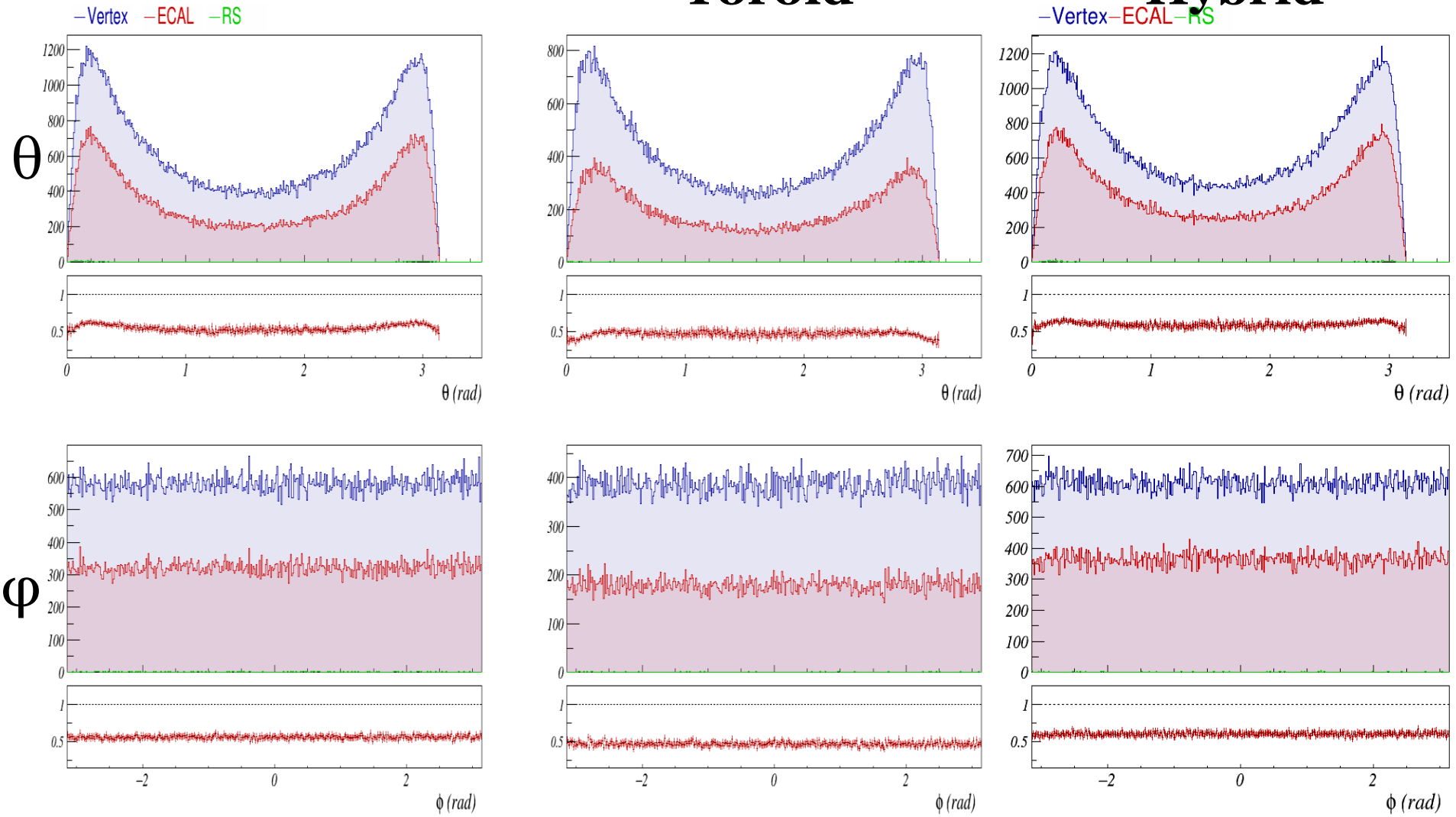
Solenoid | **Toroid** | **Hybrid**



Detector	Solenoid %	Toroid %	Hybrid %
ECAL	55.92	46.41	**59.75**

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

Solenoid | **Toroid** | **Hybrid**

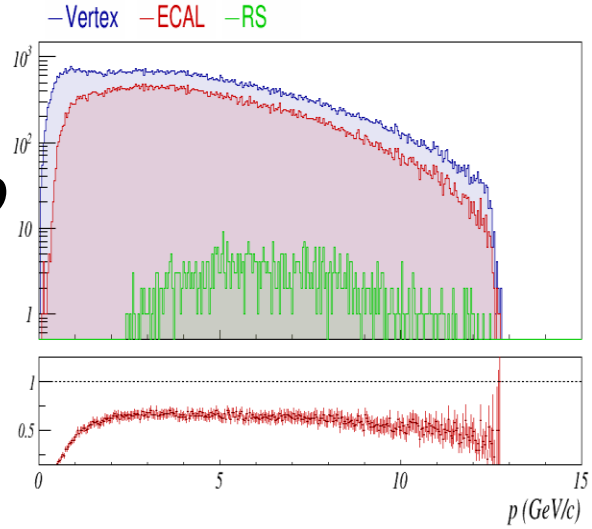


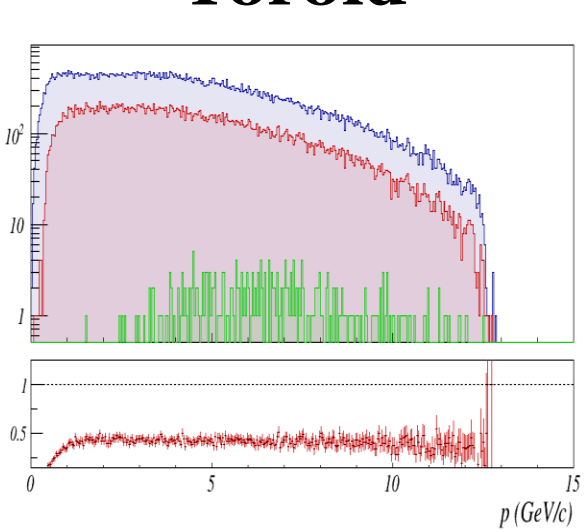
Detector	Solenoid %	Toroid %	Hybrid %
ECAL	55.92	46.41	**59.75**

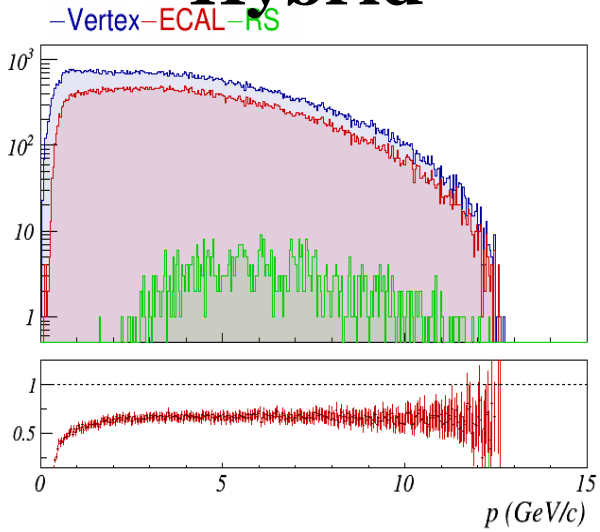
Solenoid vs Toroid vs Hybrid: $\Lambda \rightarrow p\pi^-$

Solenoid | **Toroid** | **Hybrid**

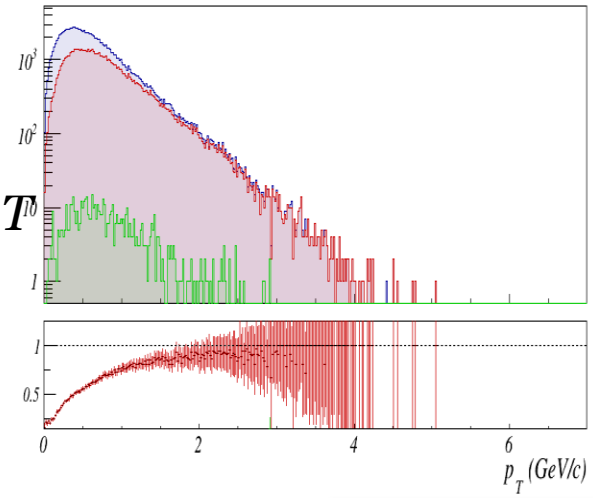
p

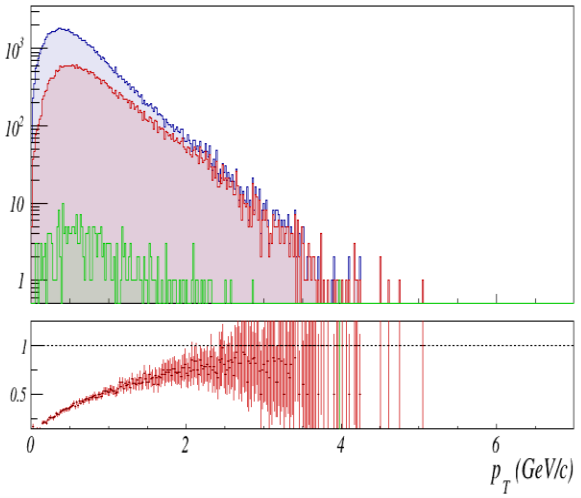


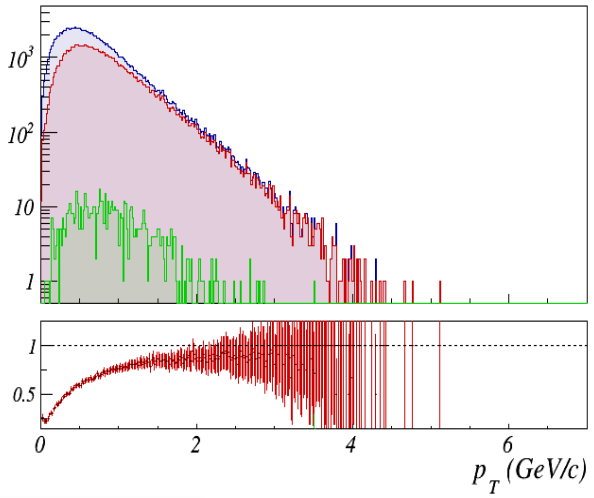




p_T



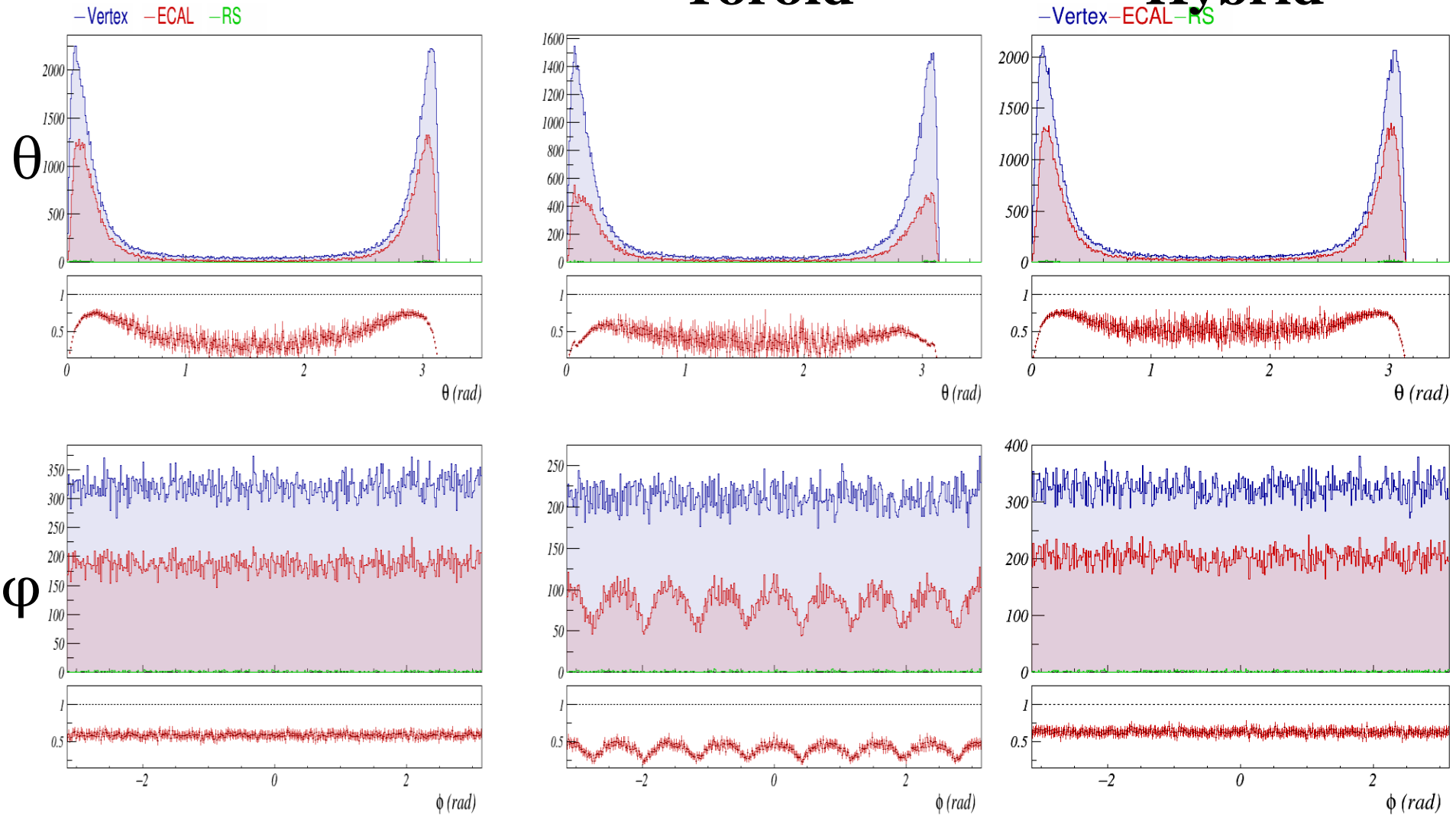




Detector	Solenoid %	Toroid %	Hybrid %
ECAL	58.59	39.80	**62.34**

Solenoid vs Toroid vs Hybrid: $\Lambda \rightarrow p\pi^-$

Solenoid | **Toroid** | **Hybrid**



Detector	Solenoid %	Toroid %	Hybrid %
ECAL	58.59	39.80	**62.34**

Conclusion

Particles	Solenoid %	Toroid %	Hybrid %
γ	94.3 (ECAL)	82.7 (ECAL)	90.4 (ECAL)
$\pi^0 \rightarrow \gamma\gamma$	88.2 (ECAL)	79.5 (ECAL)	82.4 (ECAL)
p	55.48 (ECAL)	48.54 (ECAL)	79.97 (ECAL)
n	77.01 (ECAL)	65.82 (ECAL)	81.00 (ECAL)
$\pi^{\pm}$	79.74 (ECAL)	71.86 (ECAL)	80.12 (ECAL)
$K^{\pm}$	63.60 (ECAL)	53.46 (ECAL)	57.36 (ECAL)
$\mu^{\pm}$	78.00 (RS)	82.31 (RS)	98.16 (RS)
$\Lambda \rightarrow p\pi^-$	58.59 (ECAL)	39.80 (ECAL)	62.34 (ECAL)
$K^0 \rightarrow \pi^+\pi^-$	55.92 (ECAL)	46.41 (ECAL)	59.75 (ECAL)