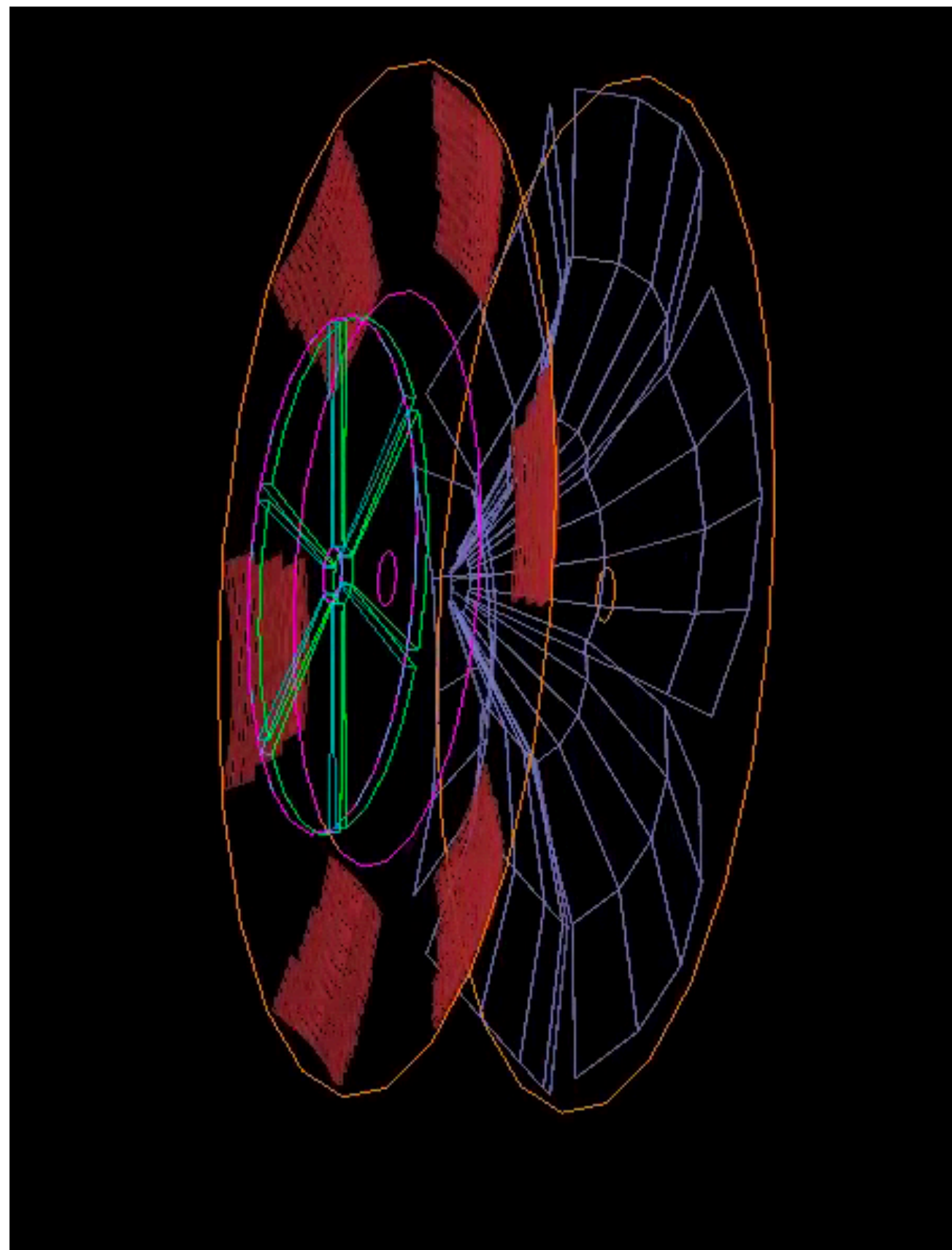




dRICH magnetic field sensitivity

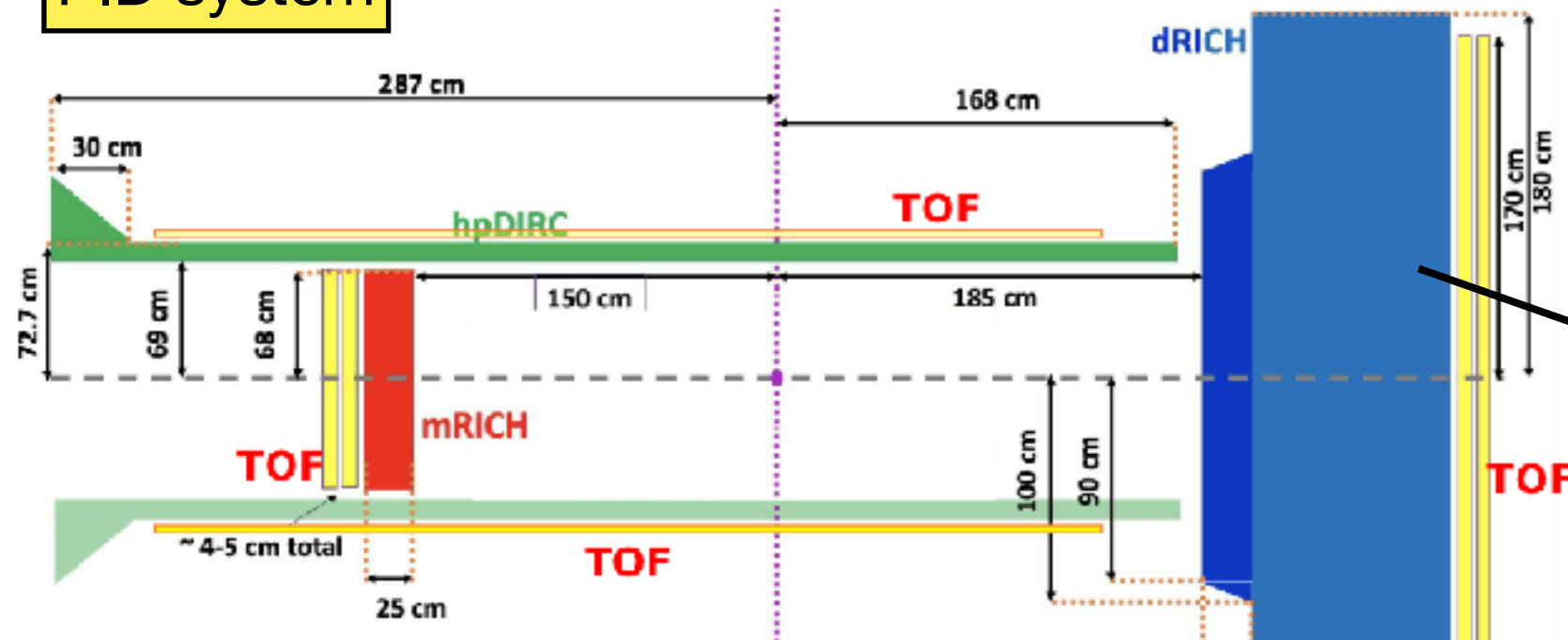
Sebastian Tapia, ISU



dRICH details

2

PID system



Vessel window

Aerogel

Filter

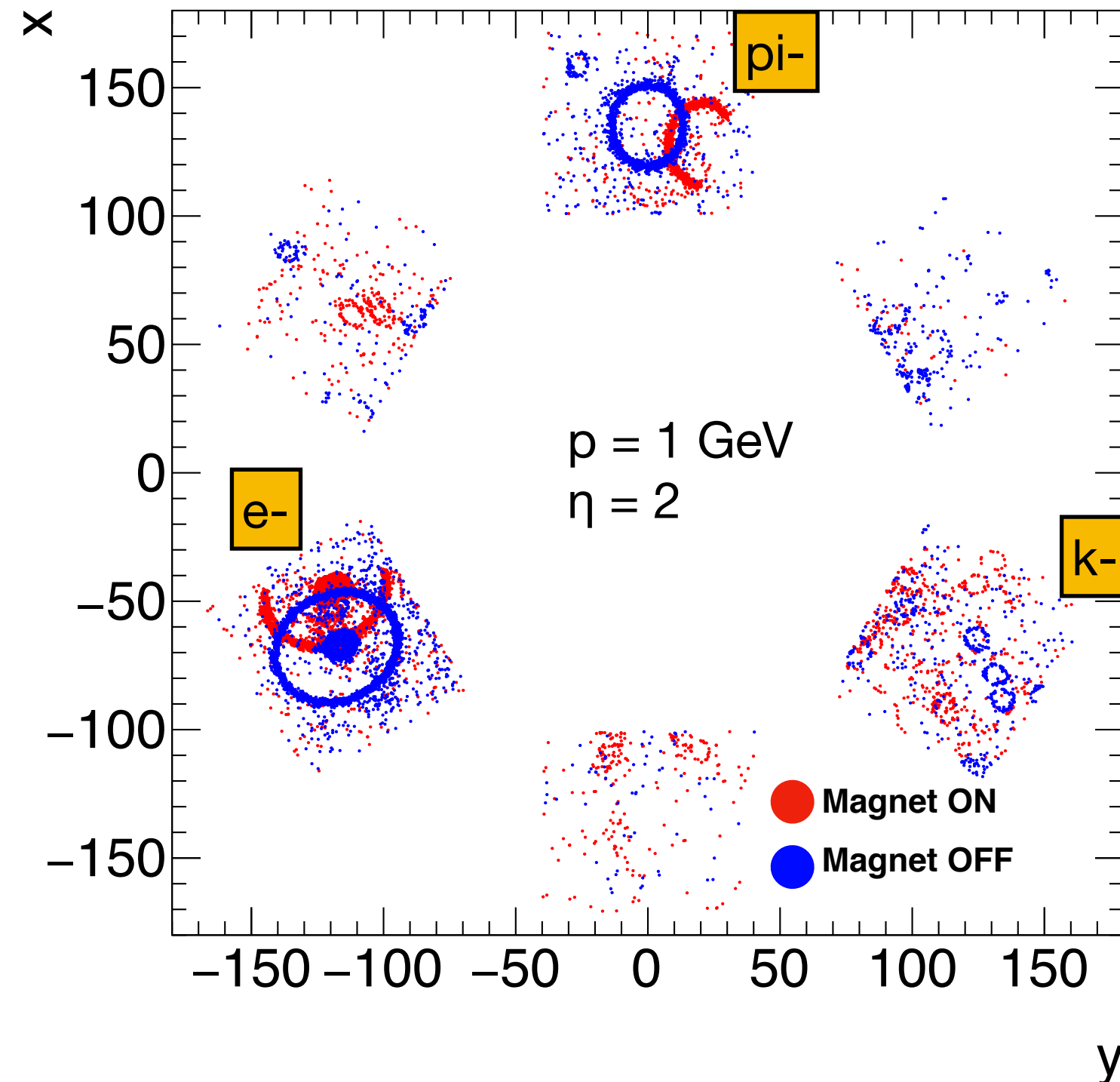
Gas

Photon-sensors and Mirror
not in final position

Magnetic field

3

Magnetic field modified “ ϕ ” of the particle, changing the entrance position and incidence angle (to the dRICH). **Is the modification affecting the reconstruction performance (ring size and width)?**

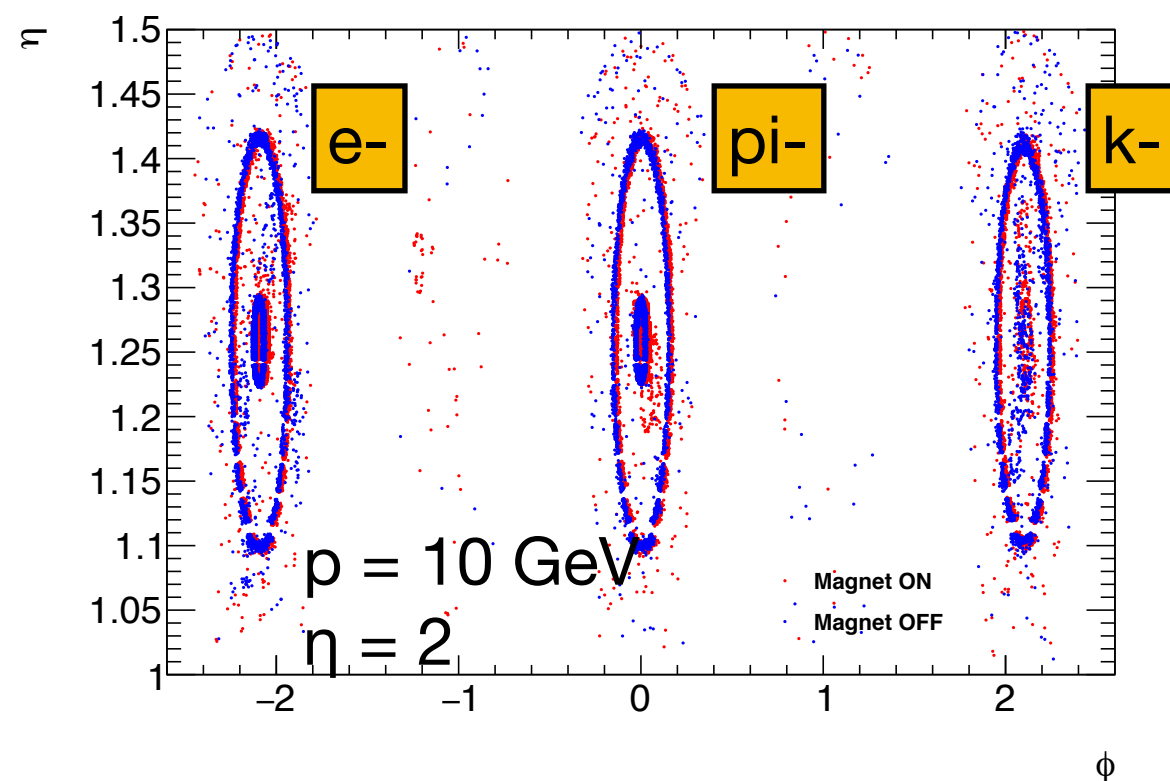
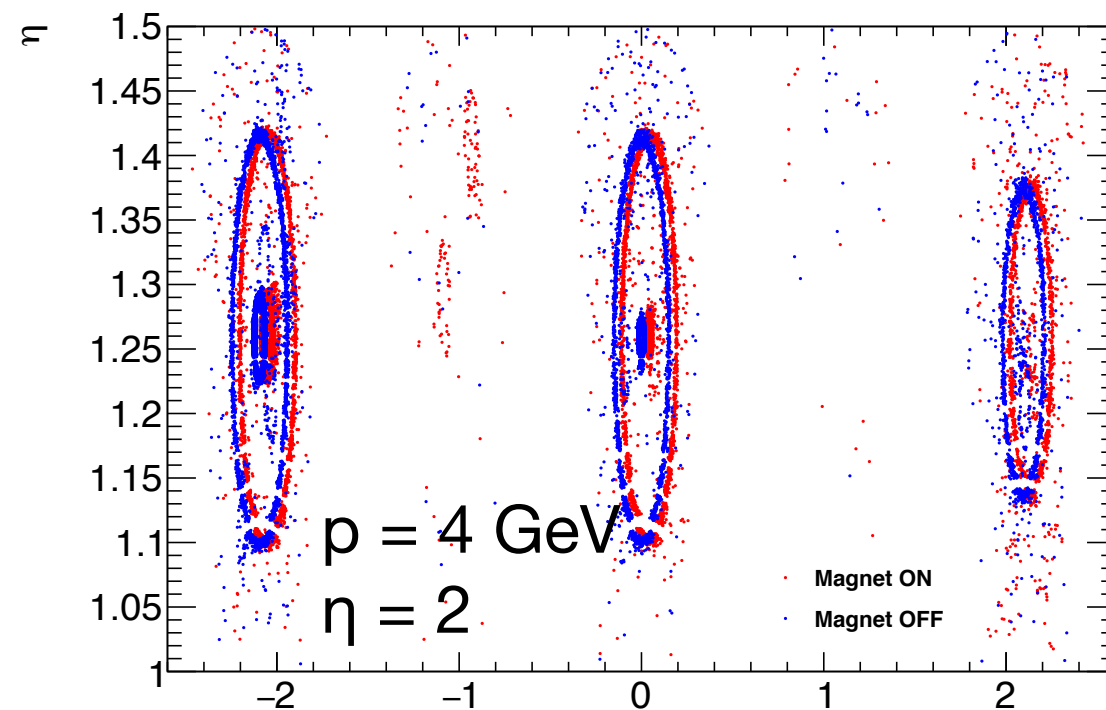
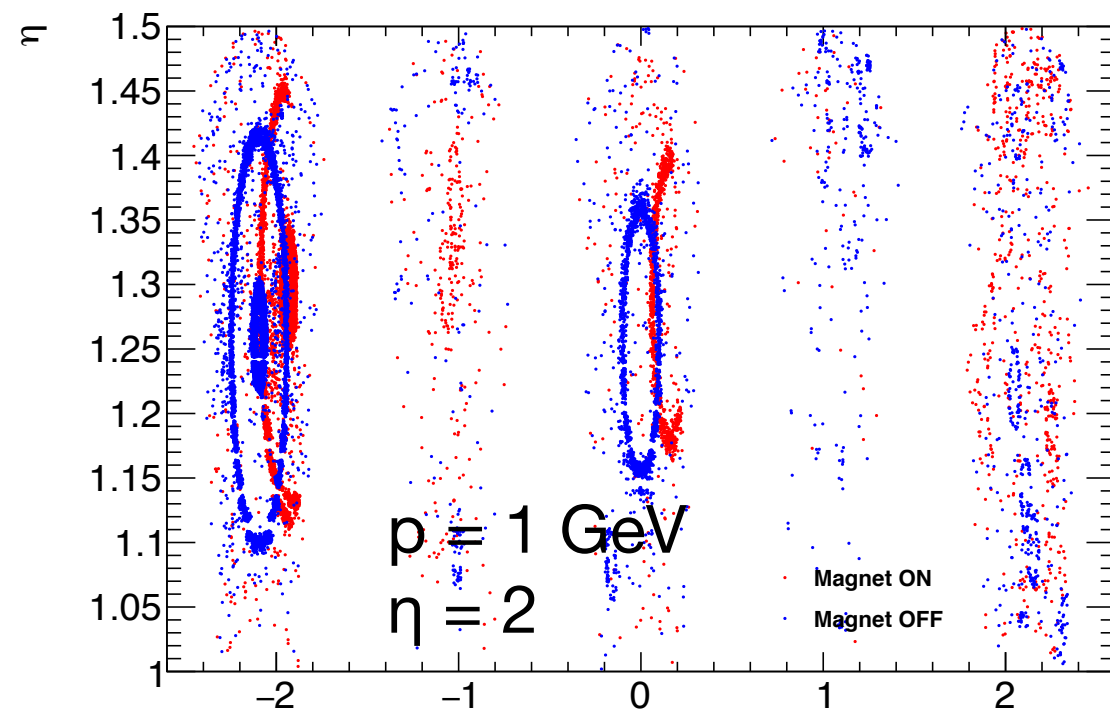


Using magnetic field map: [/cvmfs/
eic.opensciencegrid.org/ecce/gcc-8.3/release/
release_new/new.4/share/calibrations/Field/Map/
sPHENIX.2d.root](https://cvmfs/eic.opensciencegrid.org/ecce/gcc-8.3/release/release_new/new.4/share/calibrations/Field/Map/sPHENIX.2d.root)

G4MAGNET::magfield_rescale = -1.4 / 1.5;

Magnetic field

Magnetic field modified “ ϕ ” of the particle, changing the entrance position and incidence angle (to the dRICH). **Is the modification affecting the reconstruction performance (ring size and width)?**



Magnet ON
Magnet OFF

$\eta = 2$

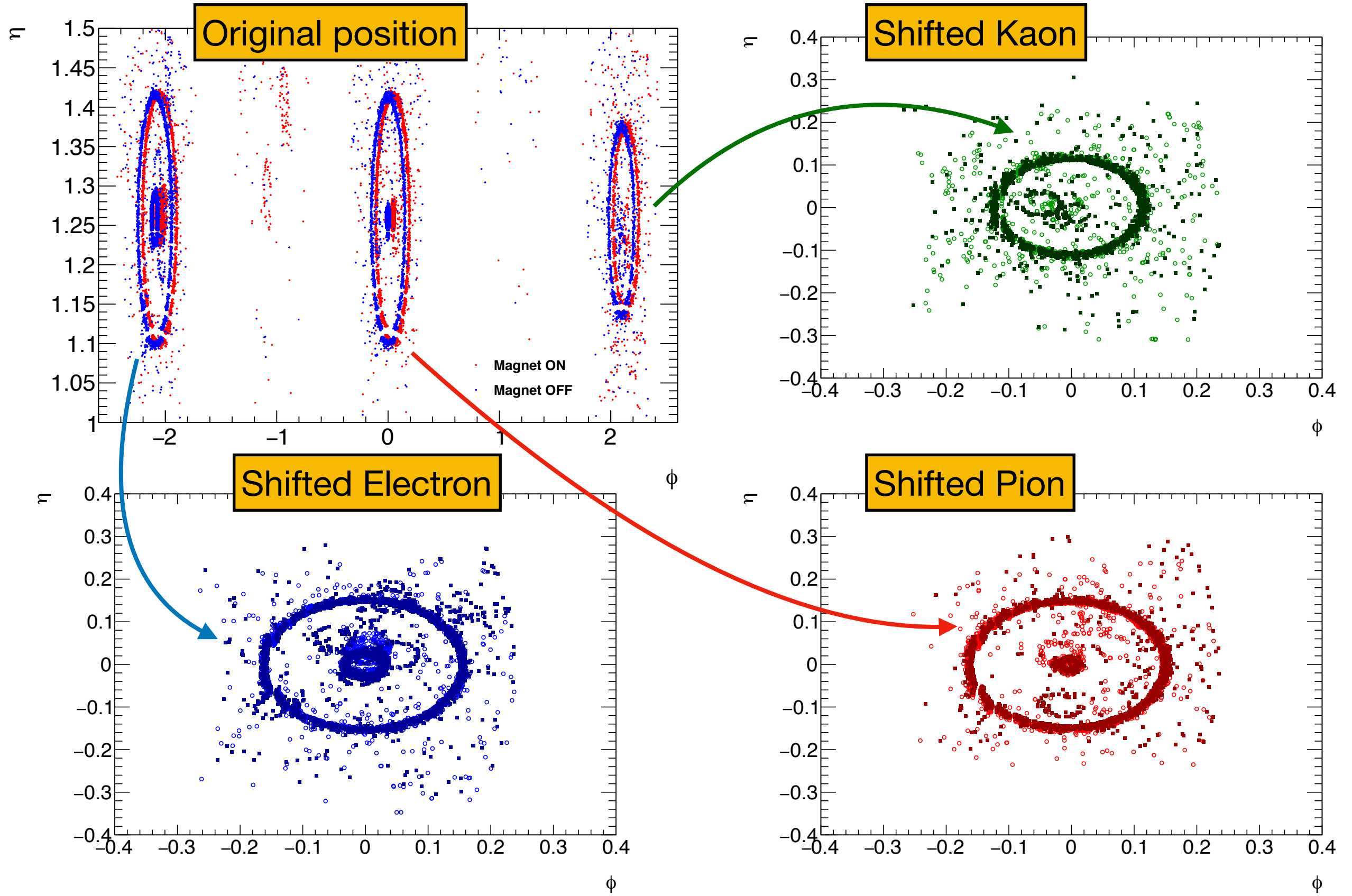
Momentum $p = 1, 4$, and 10 GeV

Particles: e^- , π^- and K^-

Magnetic field

5

In order to do the comparison, the Rings are shifted to (0,0)



Magnetic field

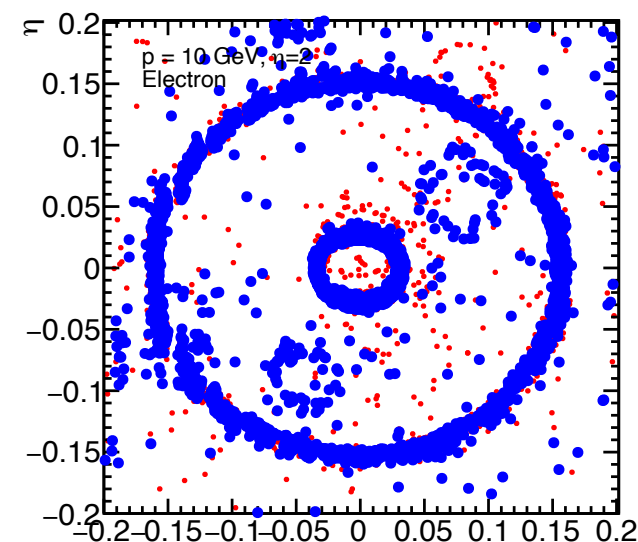
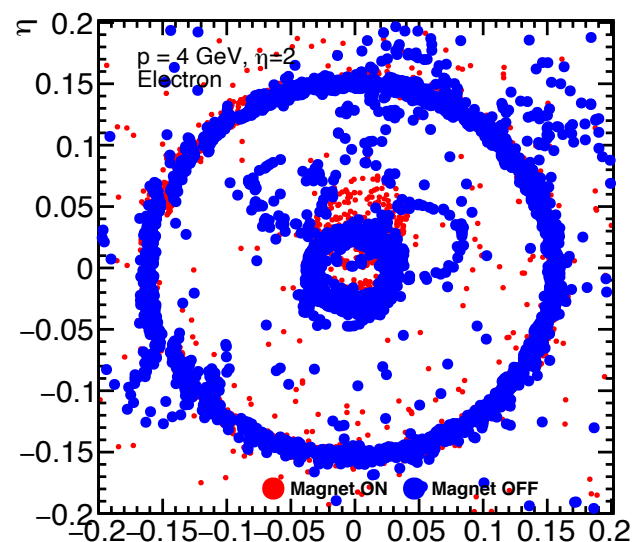
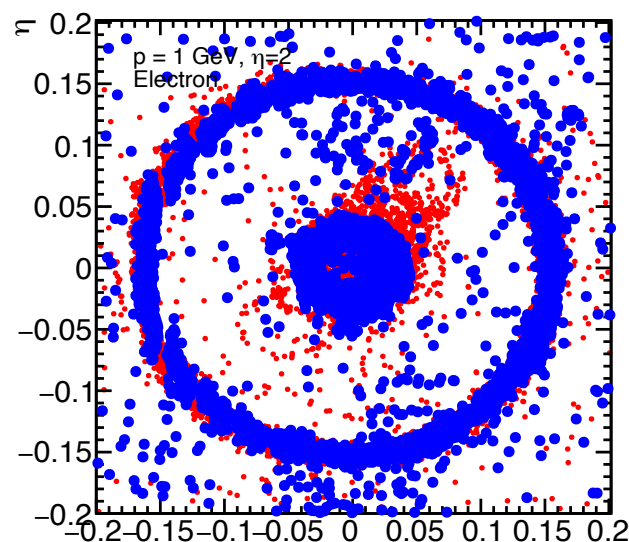
● Magnet ON
● Magnet OFF

6

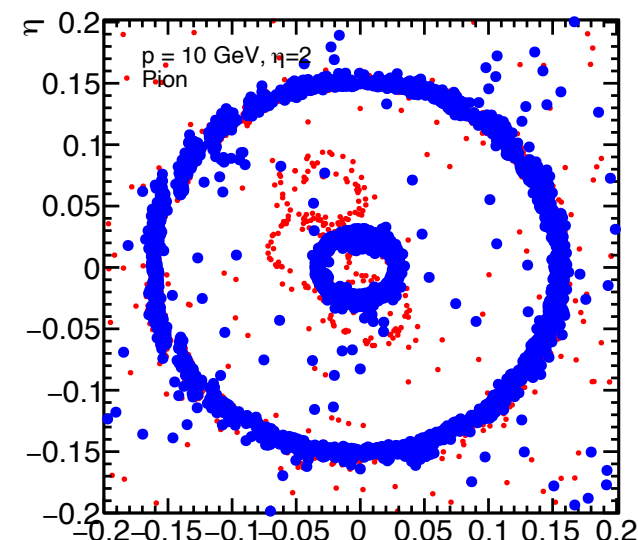
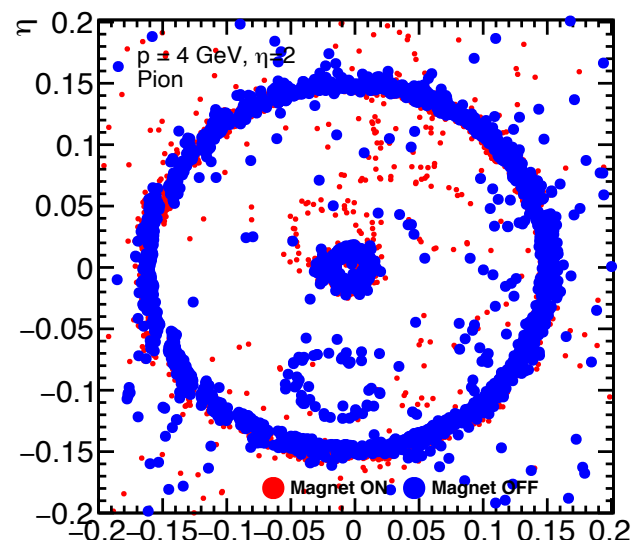
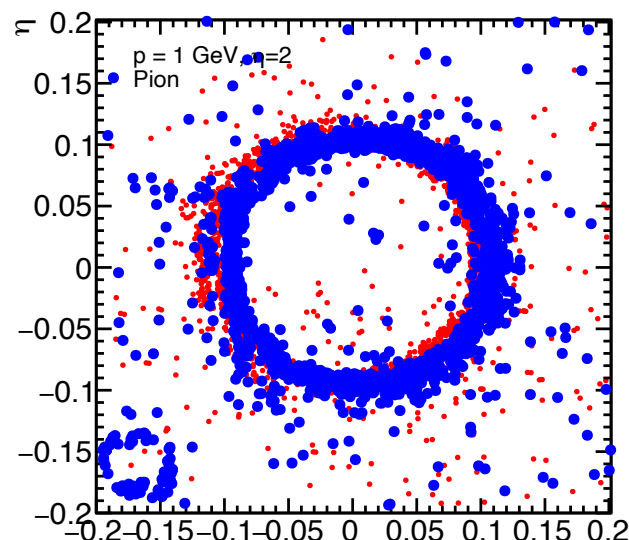
$p = 1$ GeV

$p = 4$ GeV

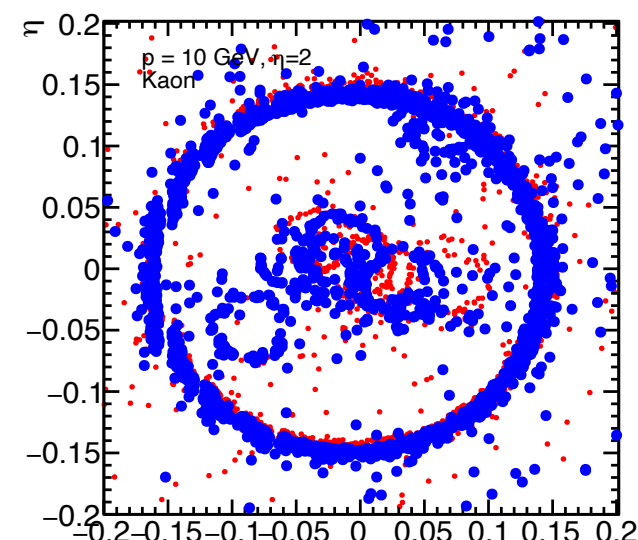
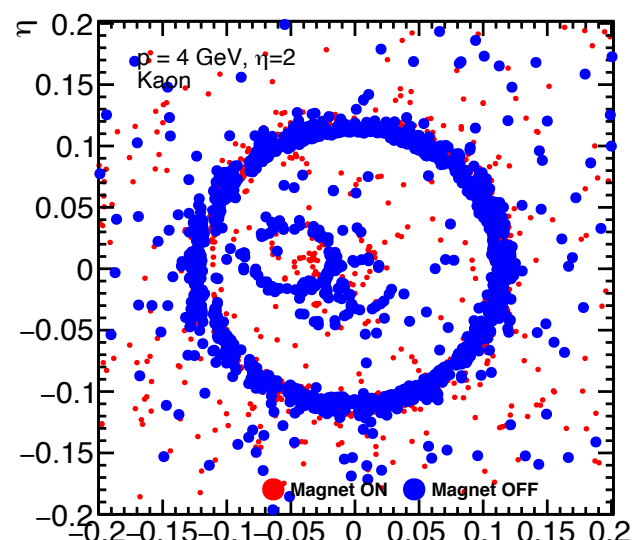
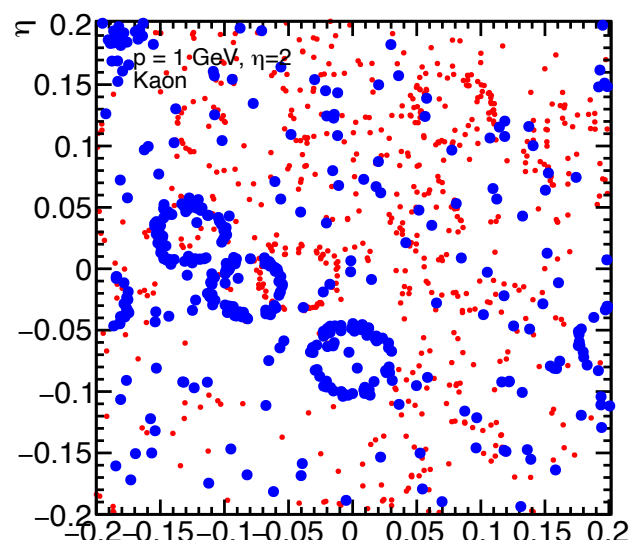
$p = 10$ GeV



e^-



π^-



K^-

Magnetic field

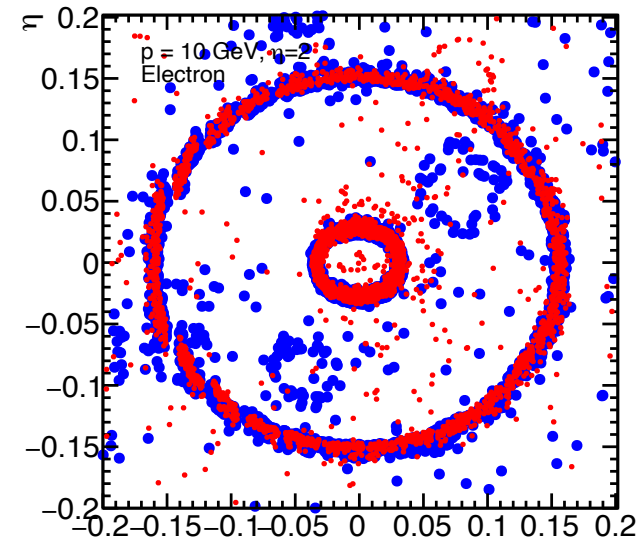
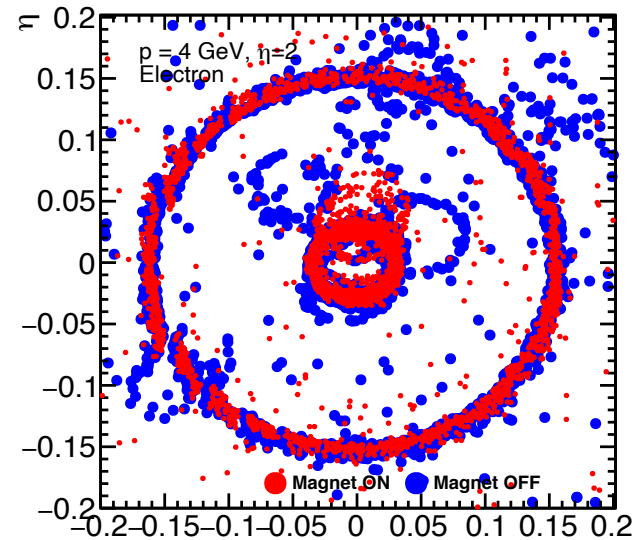
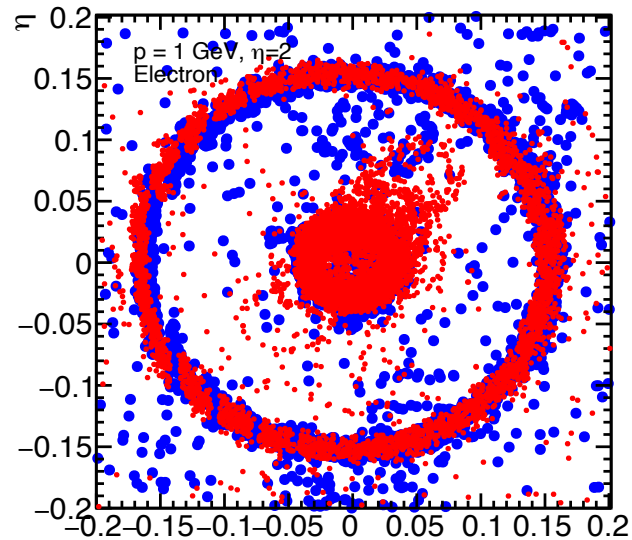
● Magnet ON
● Magnet OFF

7

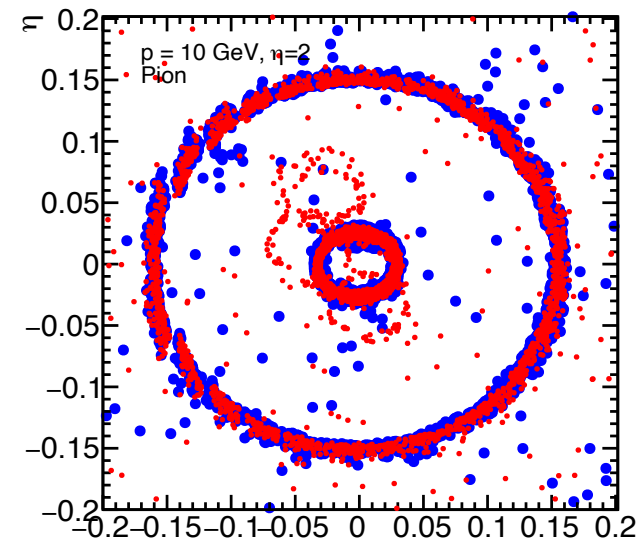
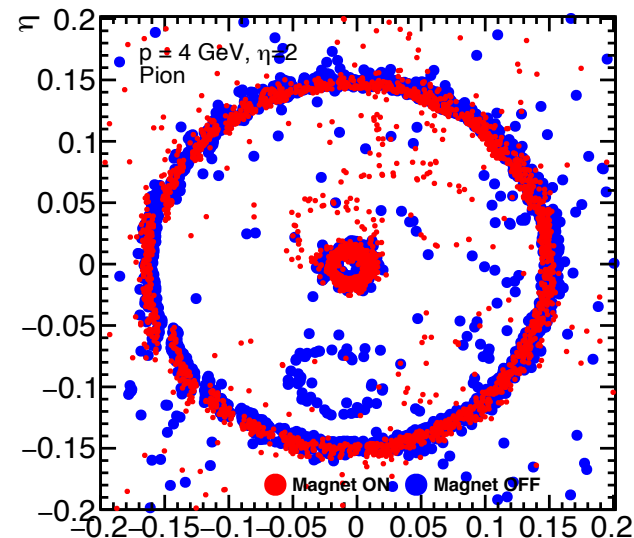
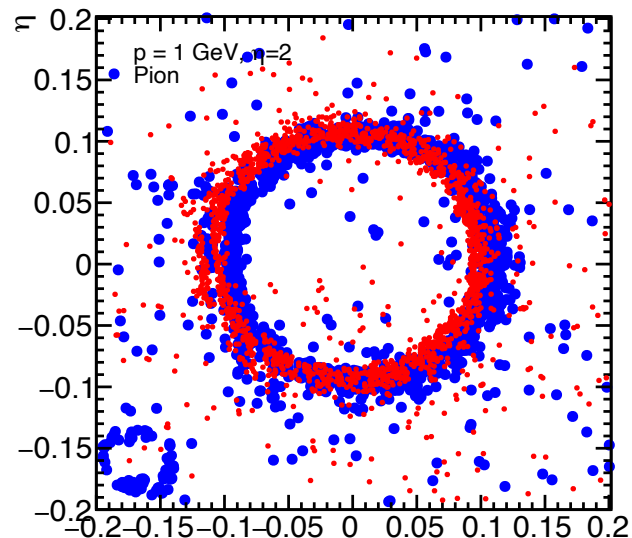
$p = 1$ GeV

$p = 4$ GeV

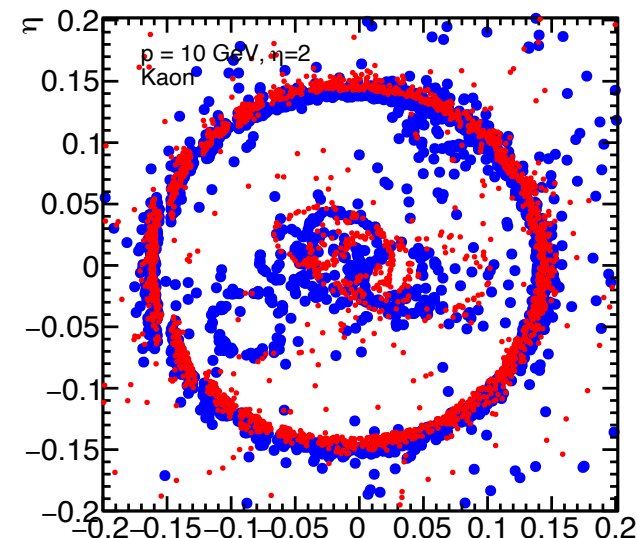
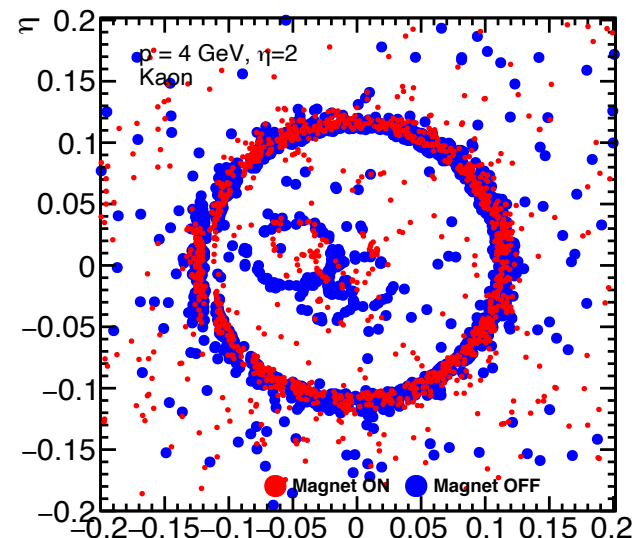
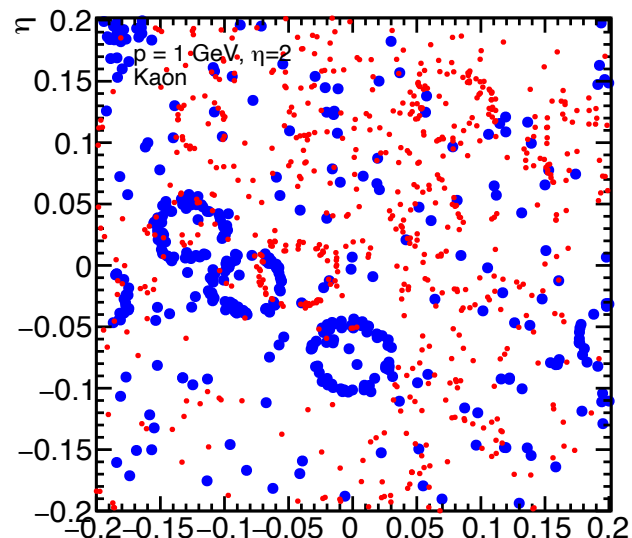
$p = 10$ GeV



e^-



π^-



K^-

ϕ

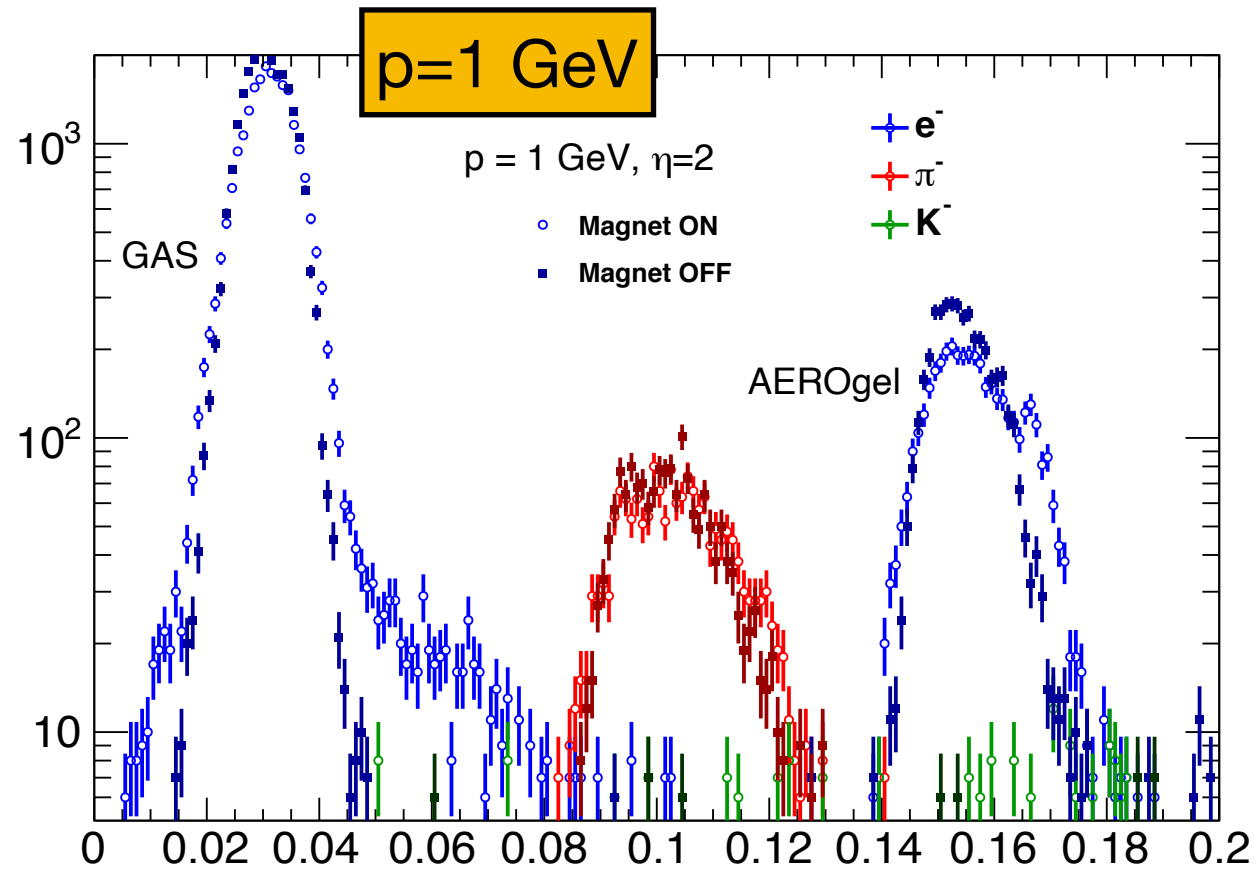
ϕ

ϕ

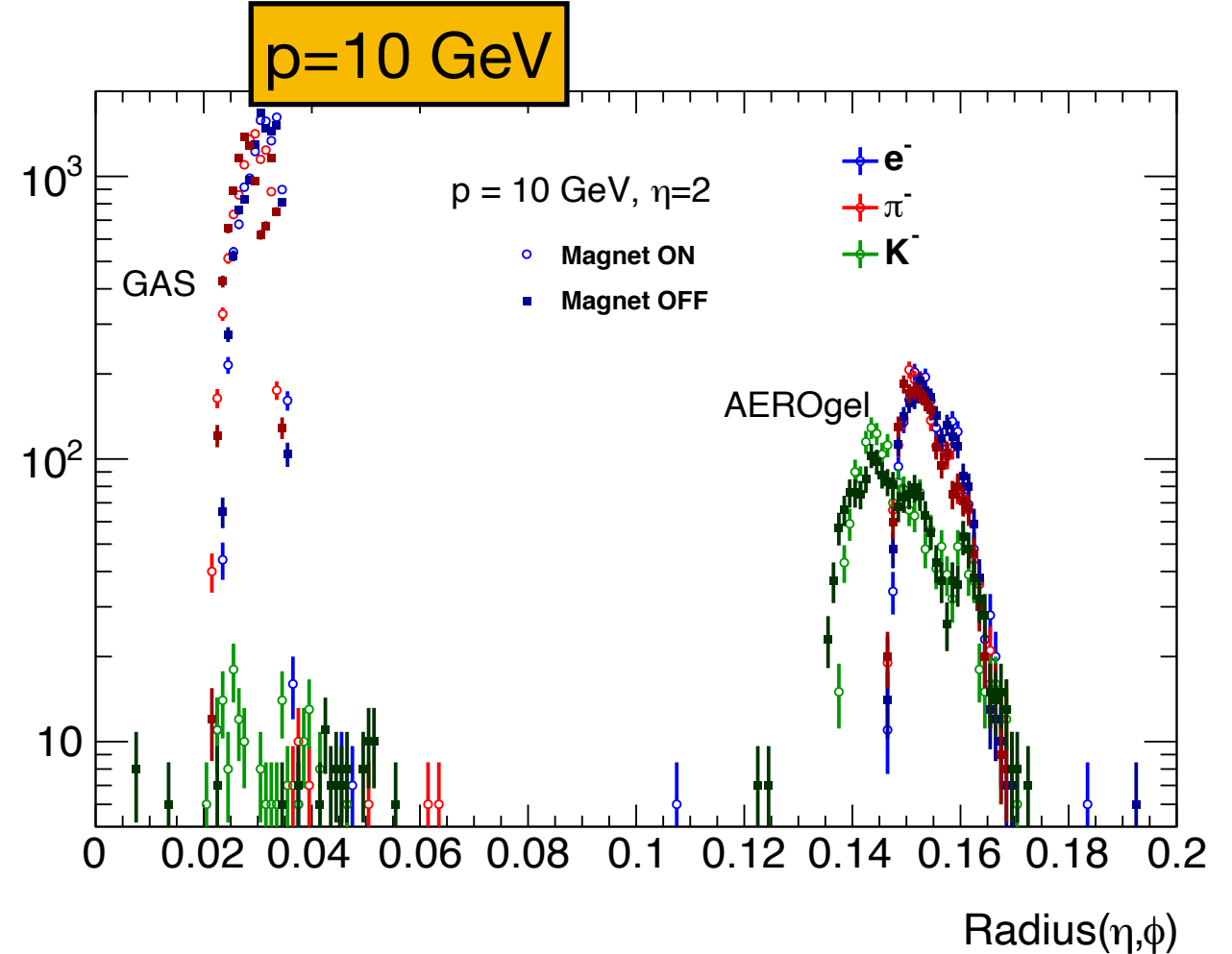
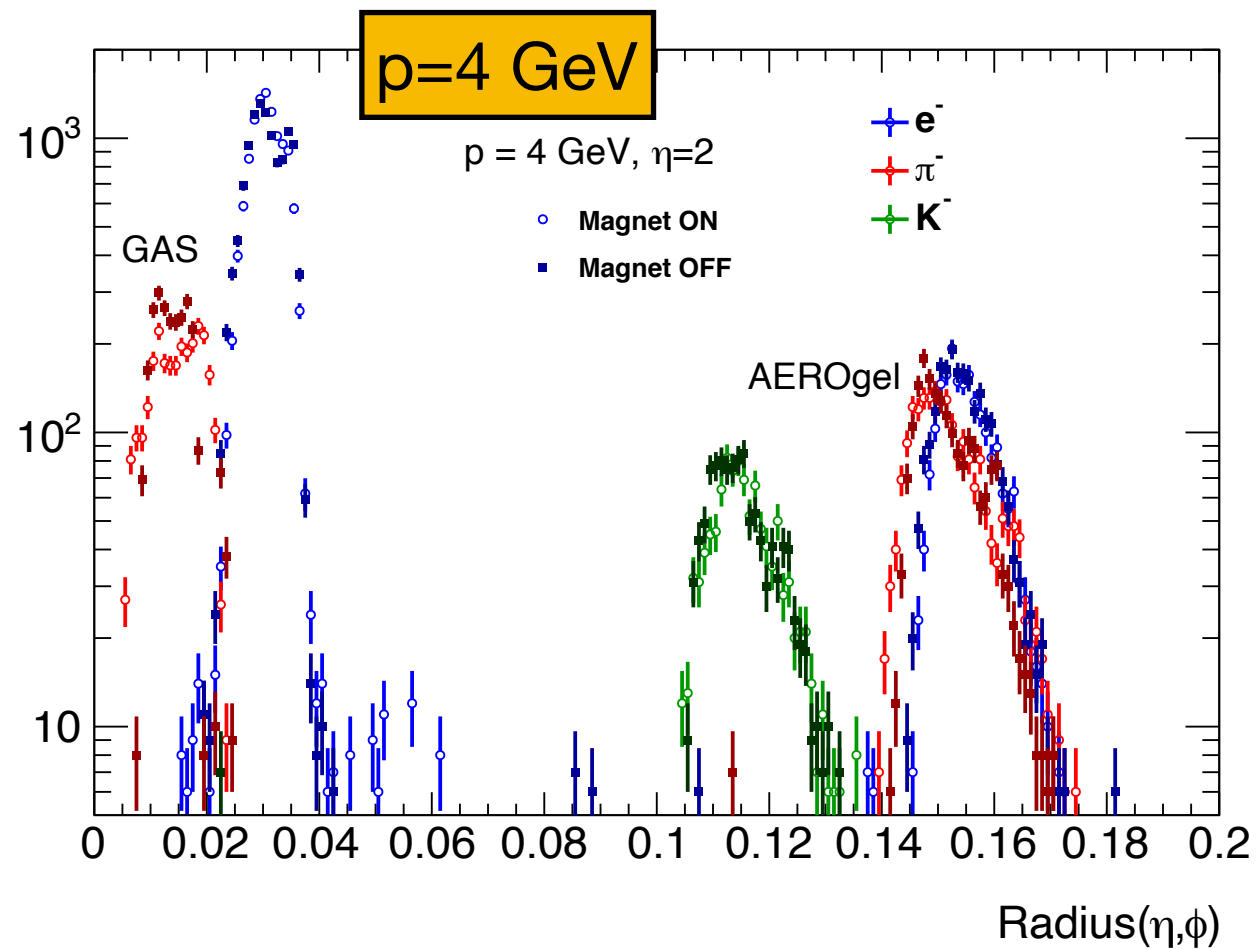
Magnetic field

$$R = \sqrt{\phi^2 + \eta^2}$$

8



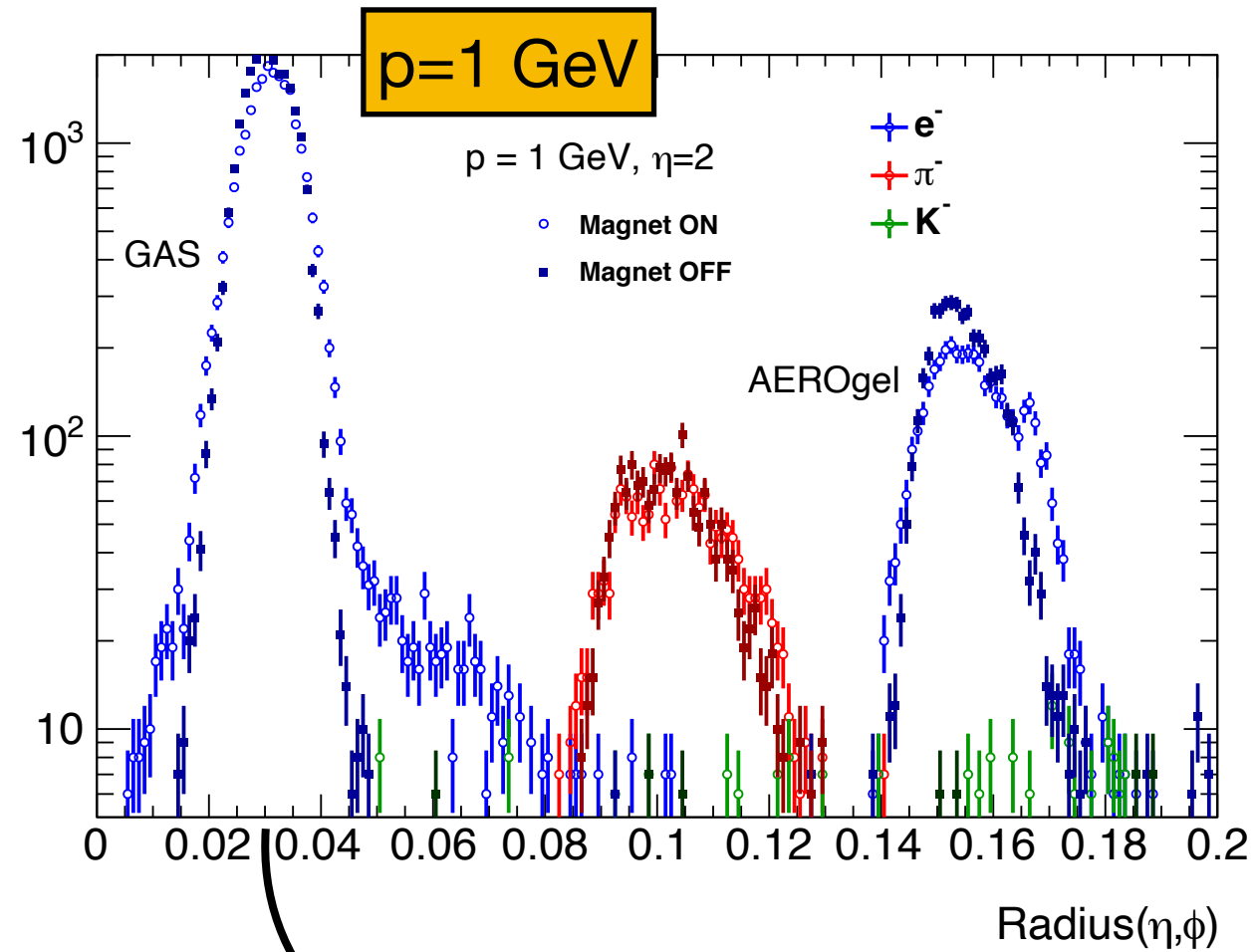
- Smeared ring for low p
- Ring size almost not changed



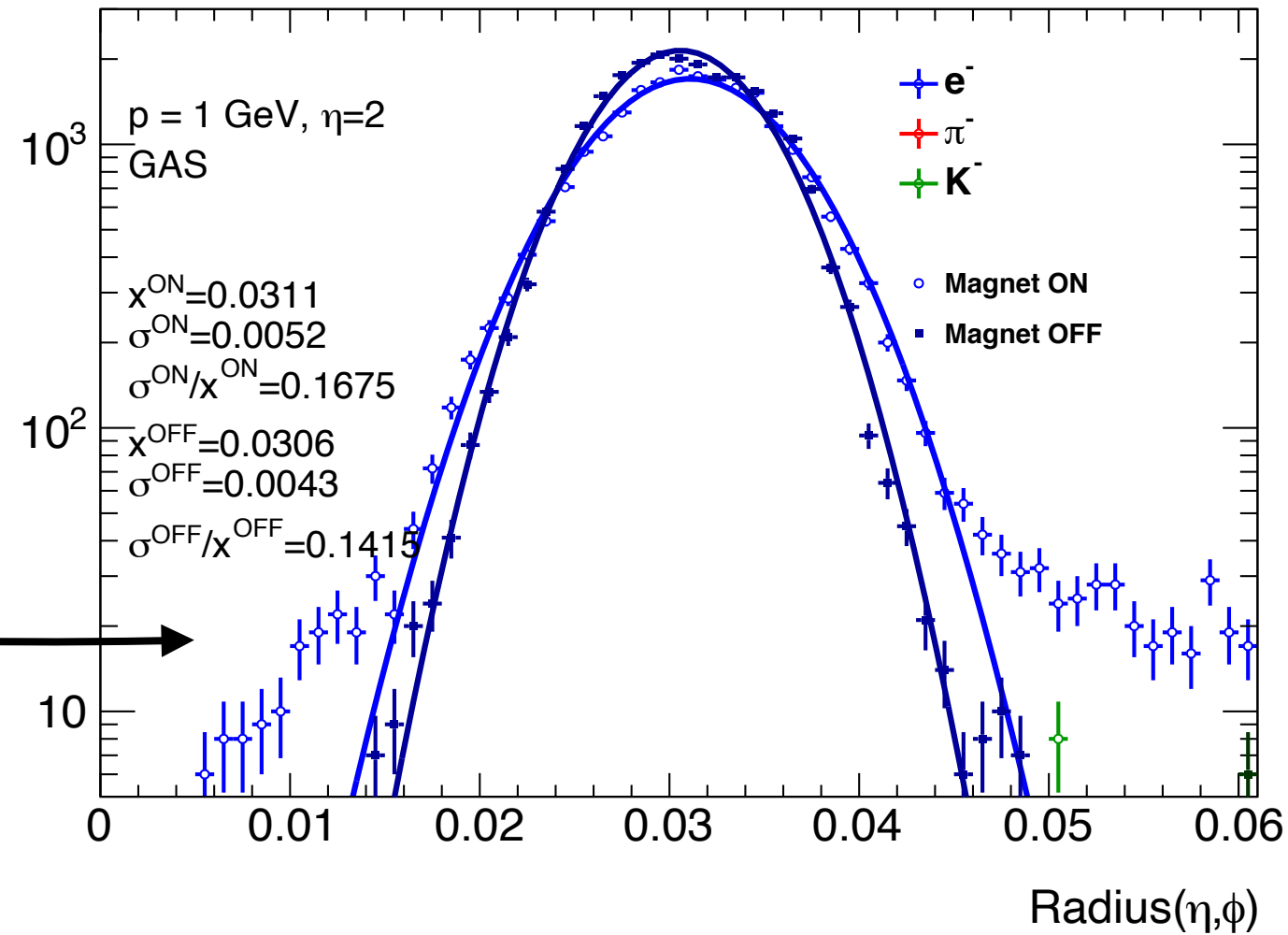
Magnetic field

$$R = \sqrt{\phi^2 + \eta^2}$$

9



- Smeared ring for low p
- Ring size almost not changed

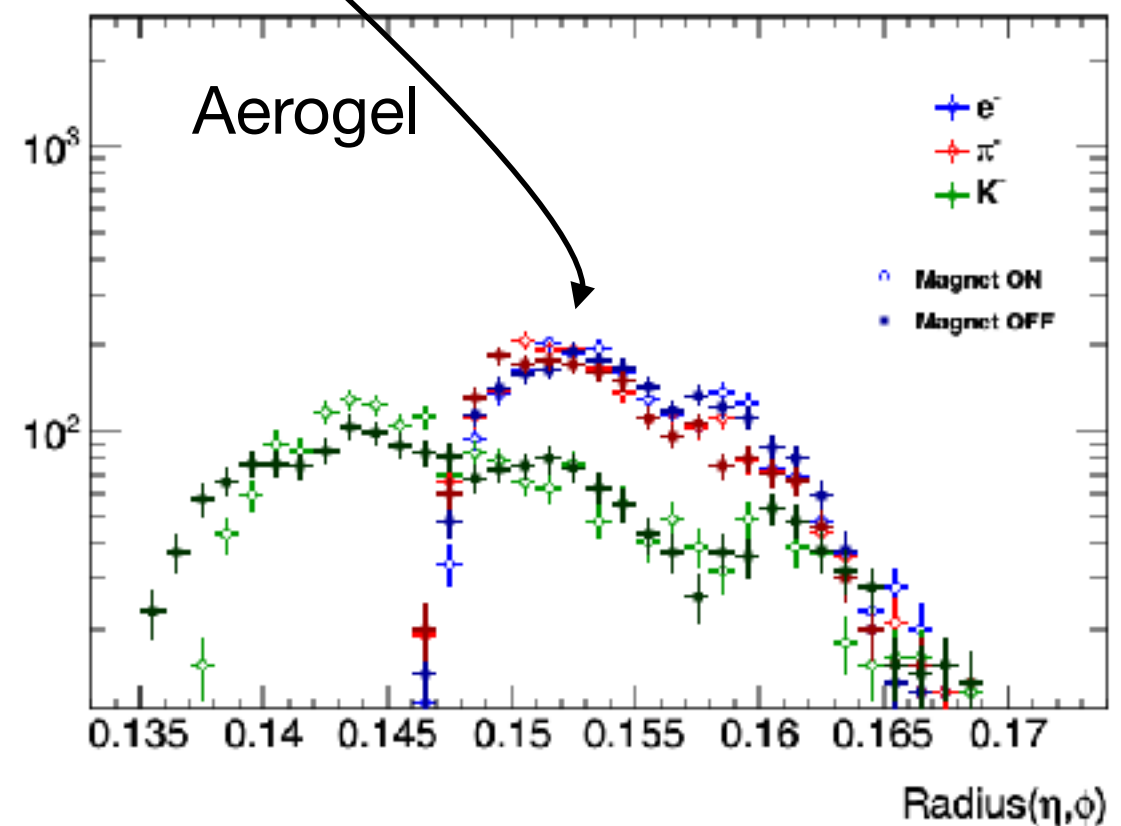
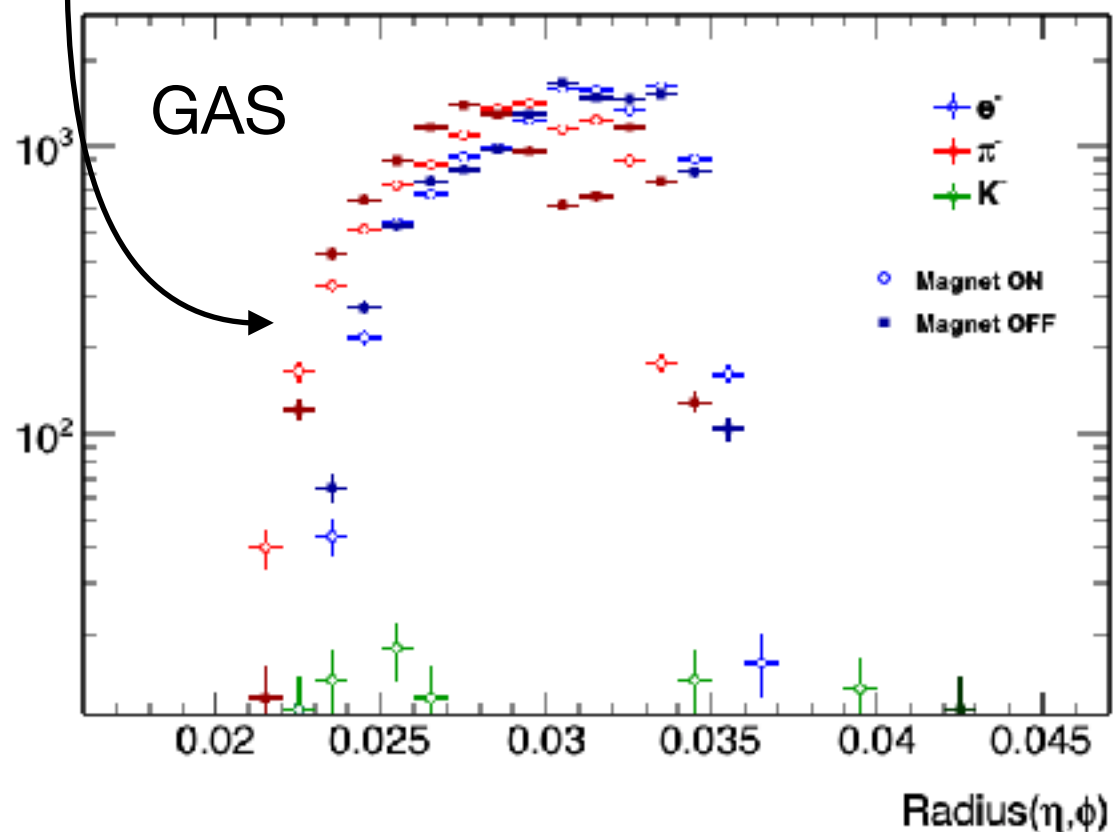
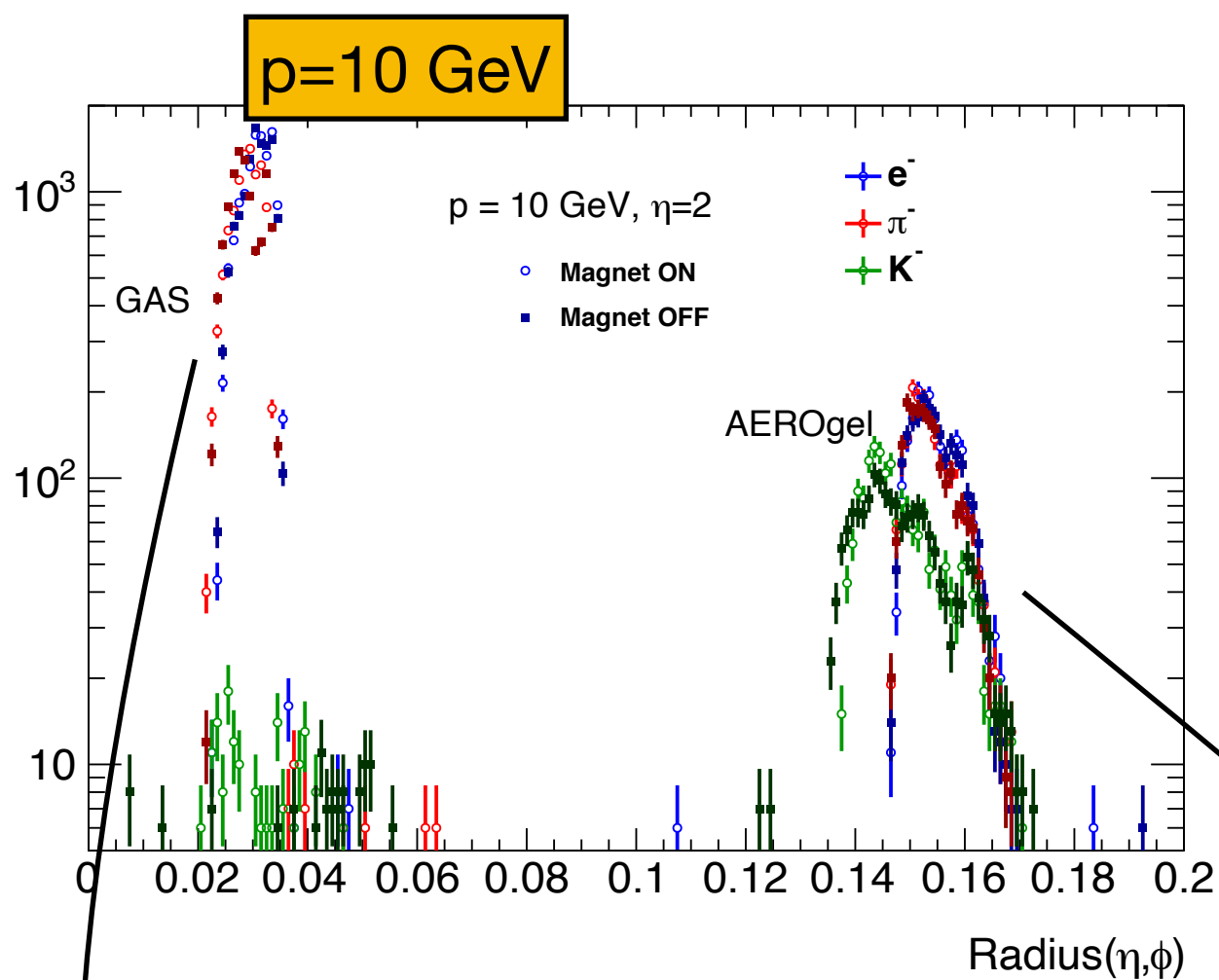


High momentum particle

10

$$R = \sqrt{\phi^2 + \eta^2}$$

- No large difference between π/e at 10 GeV



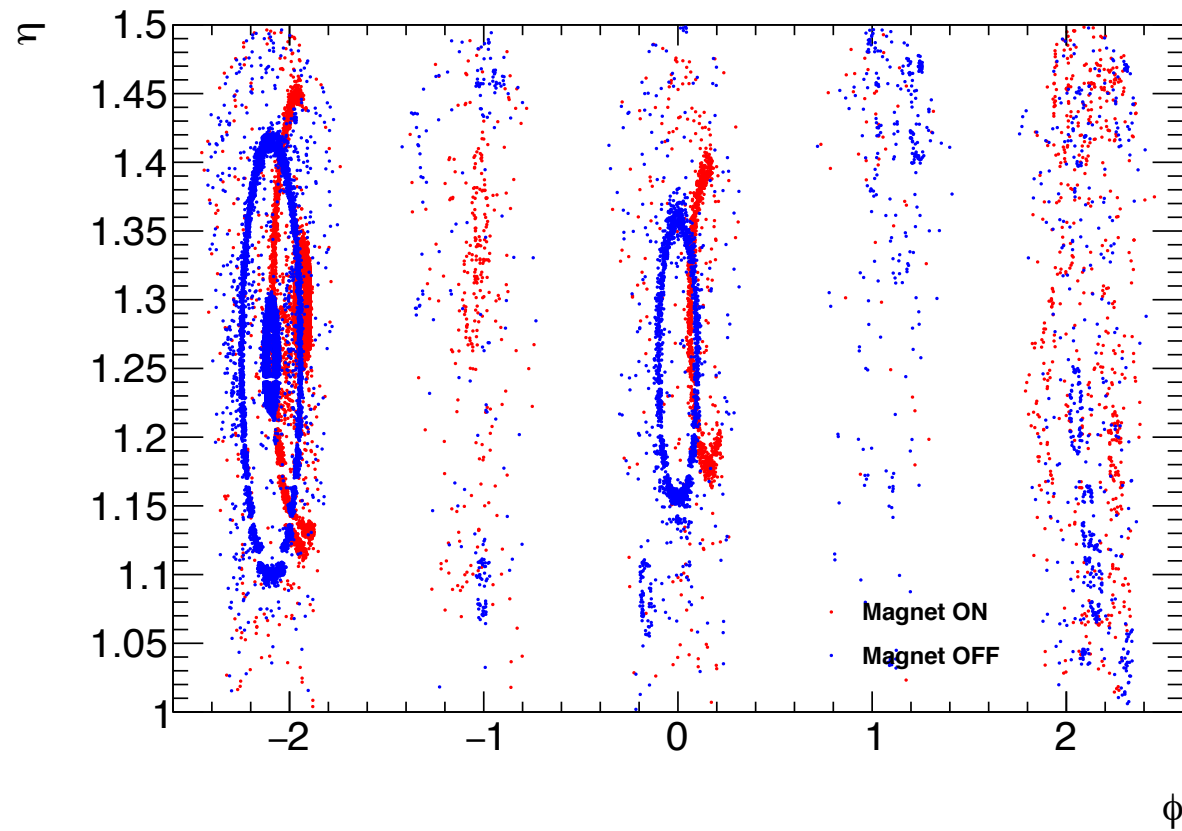
- Cherenkov ring in dRICH studied for ECCE simulation for $p=1, 4$, and 10 GeV, $\eta=2$ and electrons, pions and kaons.
- Study with Magnetic field ON and OFF
- Small smearing in the radius distribution observed in low p electrons
- Not degradation of PID performance expected

Additional slides

Magnetic field

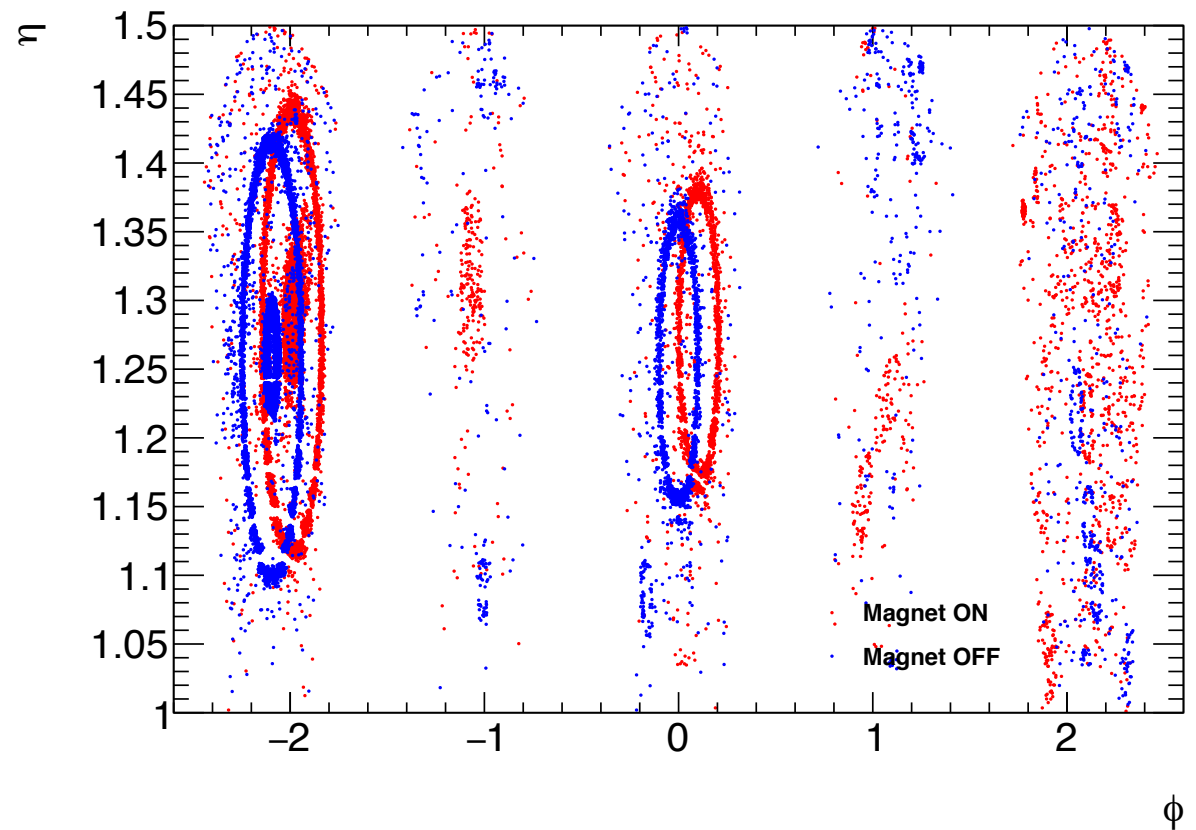
13

Very strong bending on $p=1$ GeV particles



ϕ changed at Generator level to fit the whole ring in the acceptance

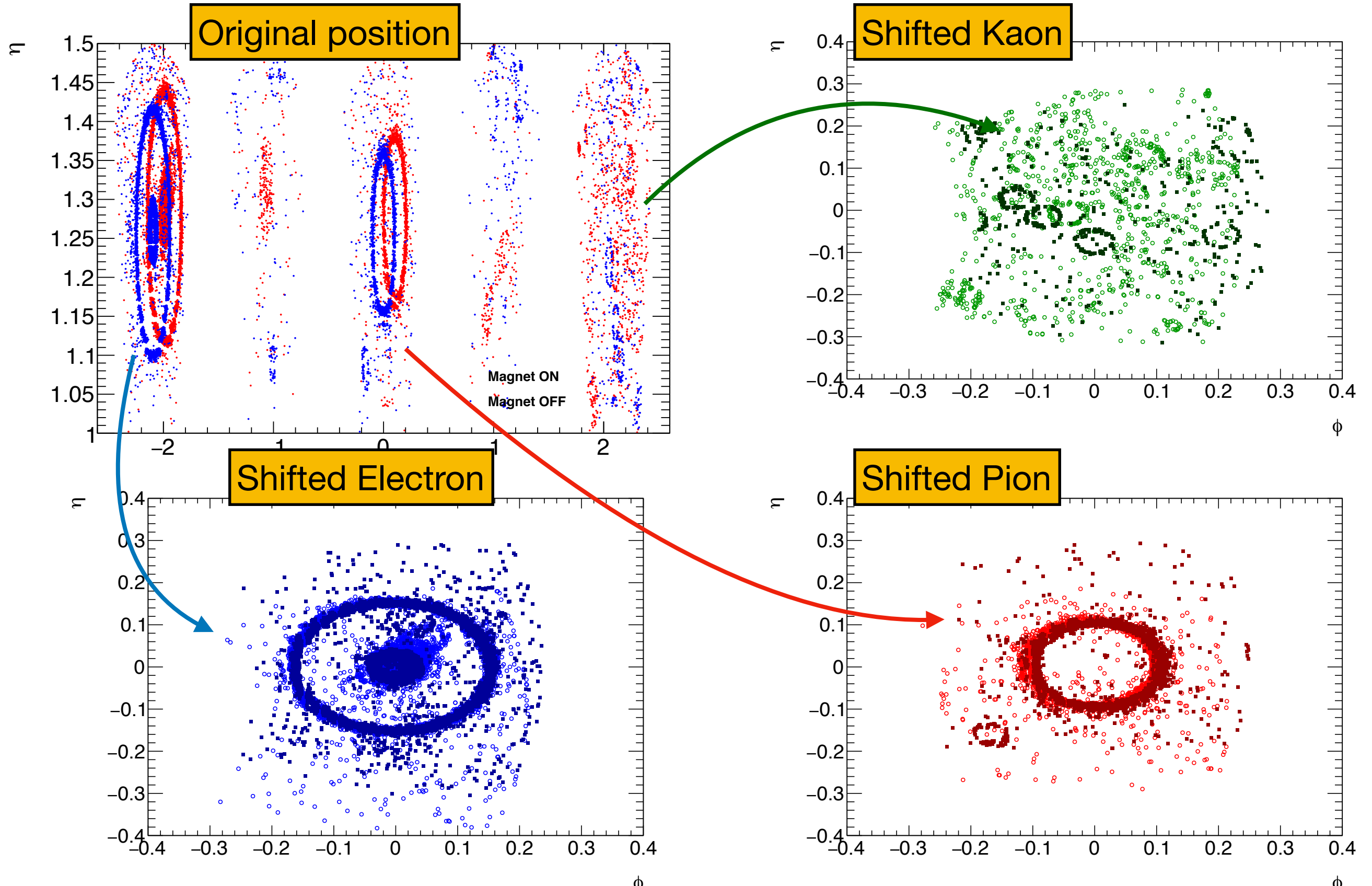
- Only for Magnet ON case
- Same η and p



Magnetic field; $p = 1$ GeV

14

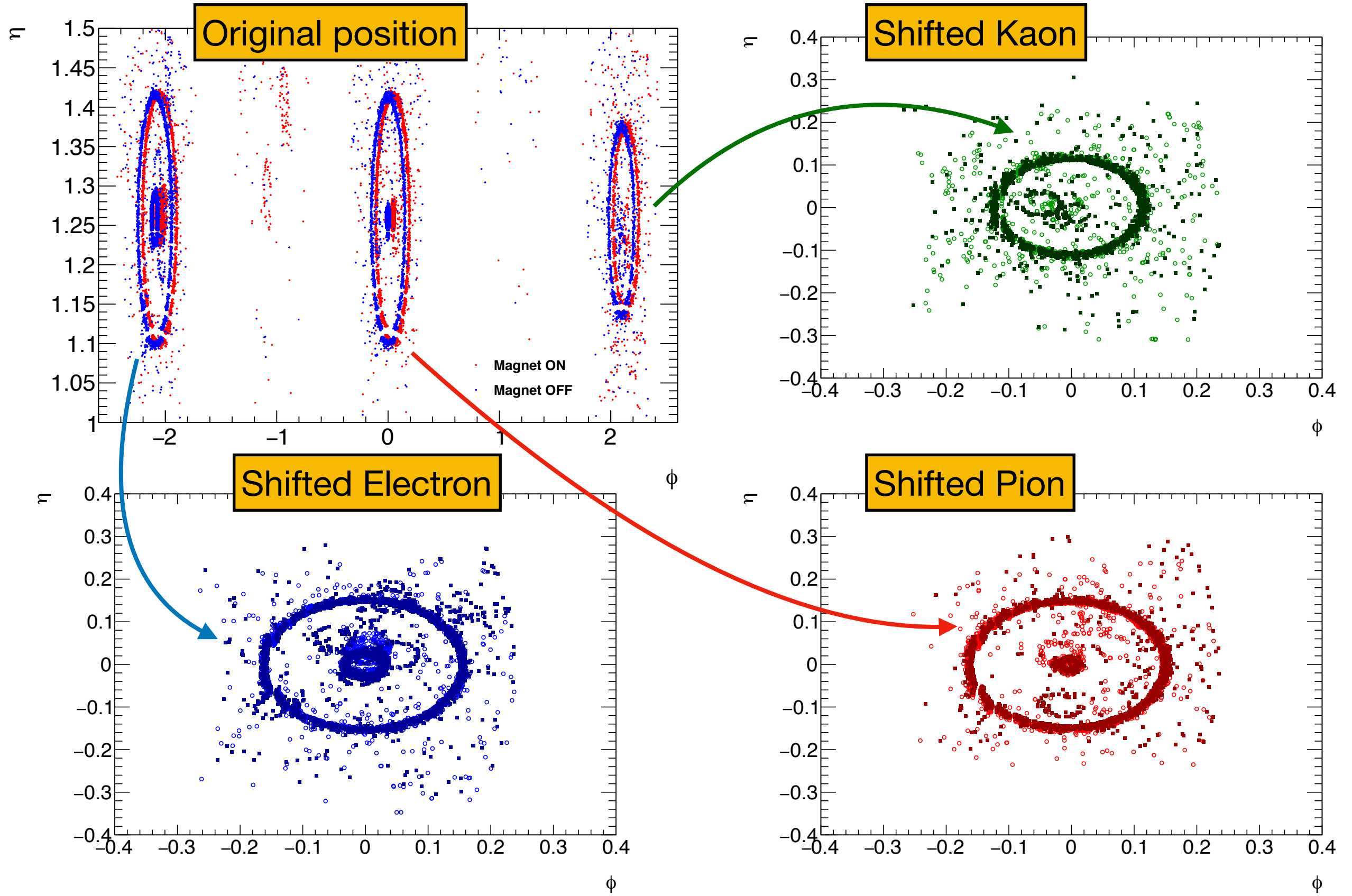
In order to do the comparison, the Rings are shifted to (0,0)



Magnetic field; $p = 4 \text{ GeV}$

15

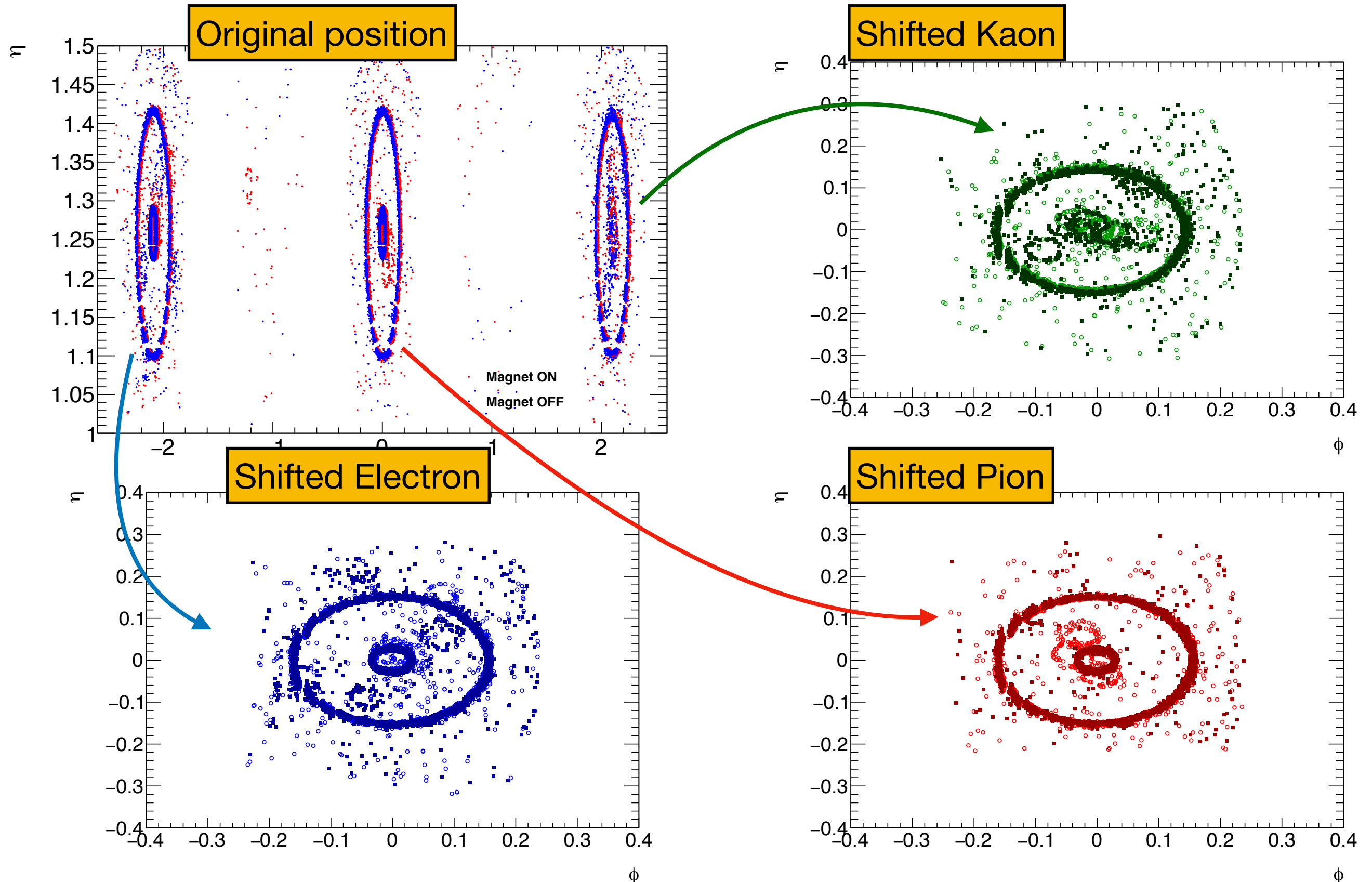
In order to do the comparison, the Rings are shifted to (0,0)



Magnetic field; $p = 10$ GeV

16

In order to do the comparison, the Rings are shifted to (0,0)



Magnetic field

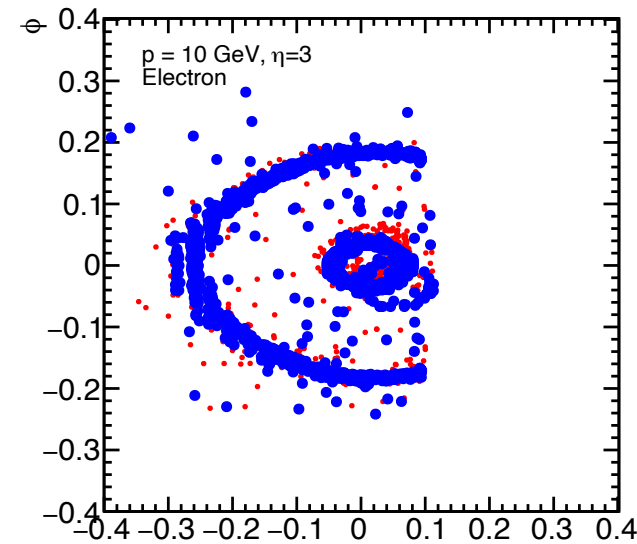
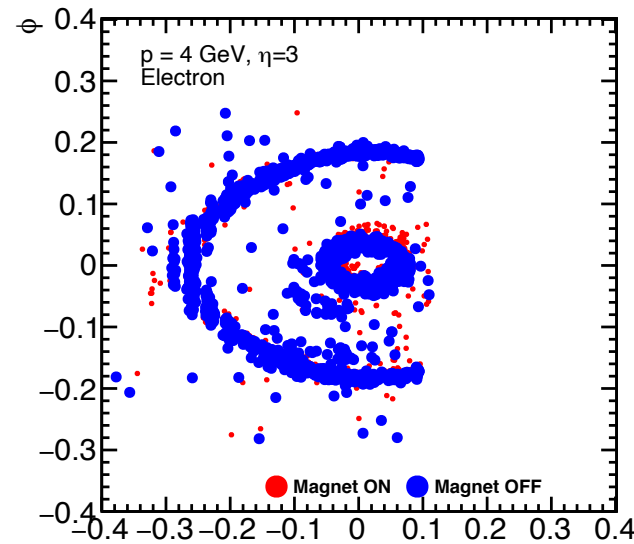
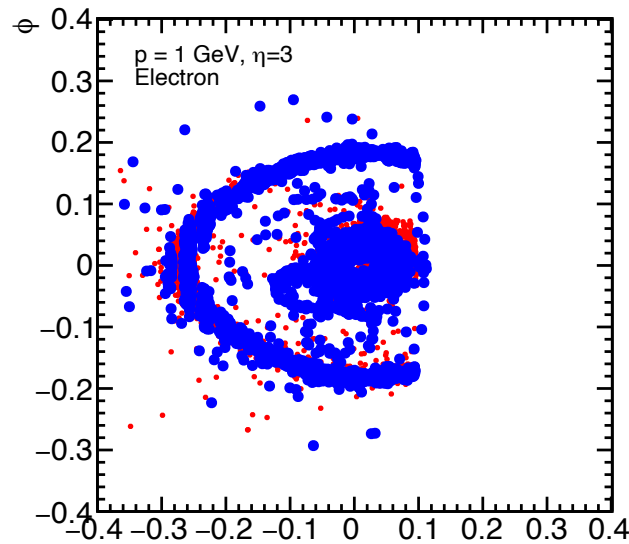
● Magnet ON
● Magnet OFF

17

$p = 1 \text{ GeV}$

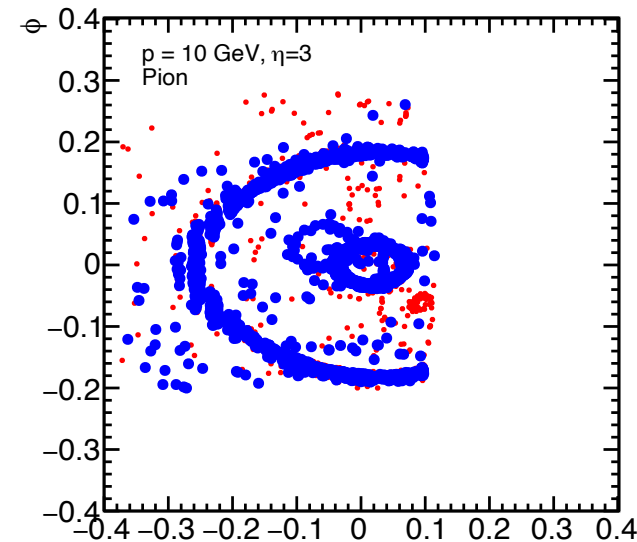
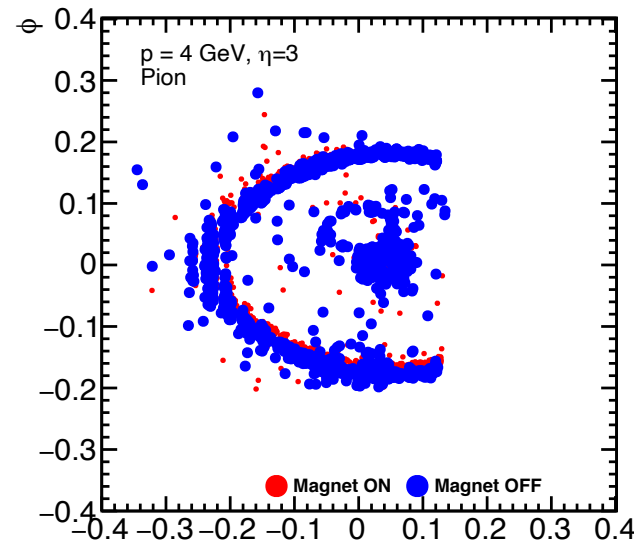
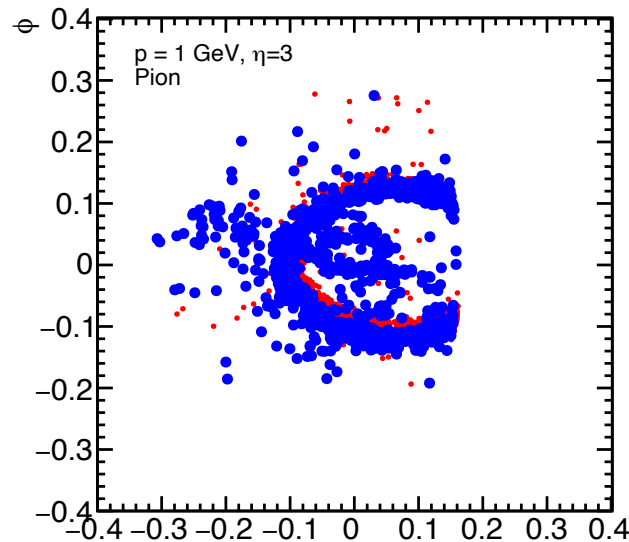
$p = 4 \text{ GeV}$

$p = 10 \text{ GeV}$



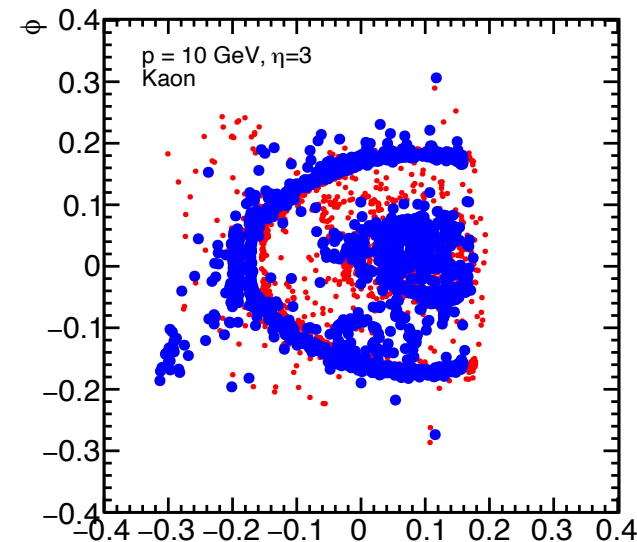
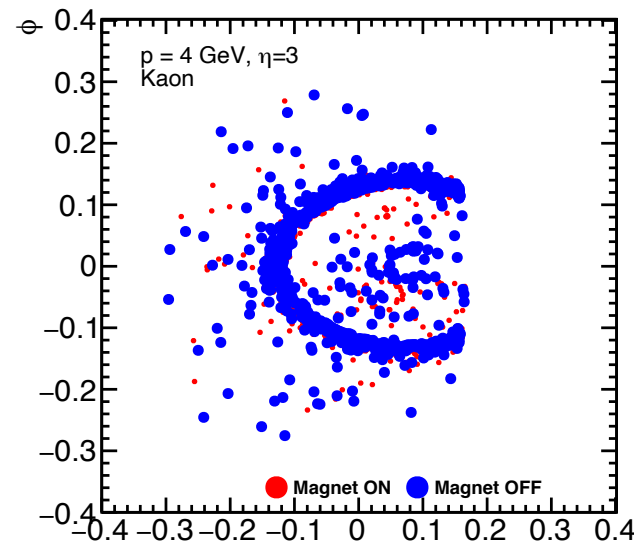
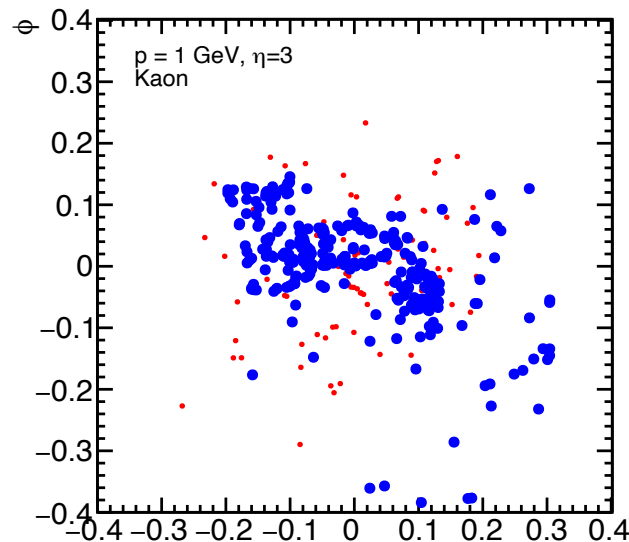
$\eta = 3$

e^-



$\eta = 3$

π^-



$\eta = 3$

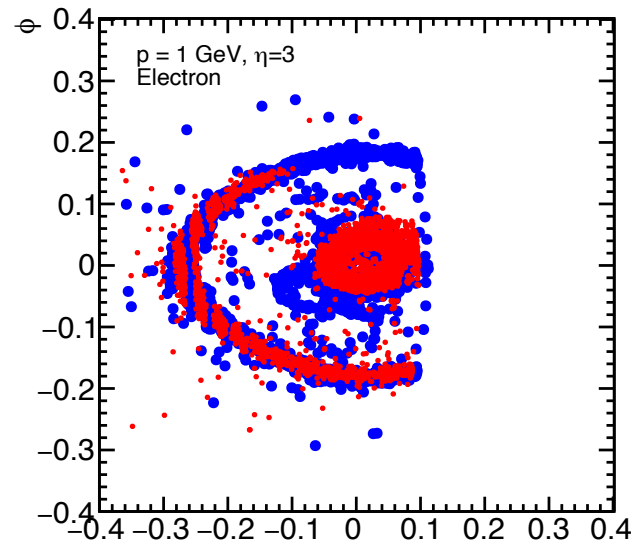
K^-

Magnetic field

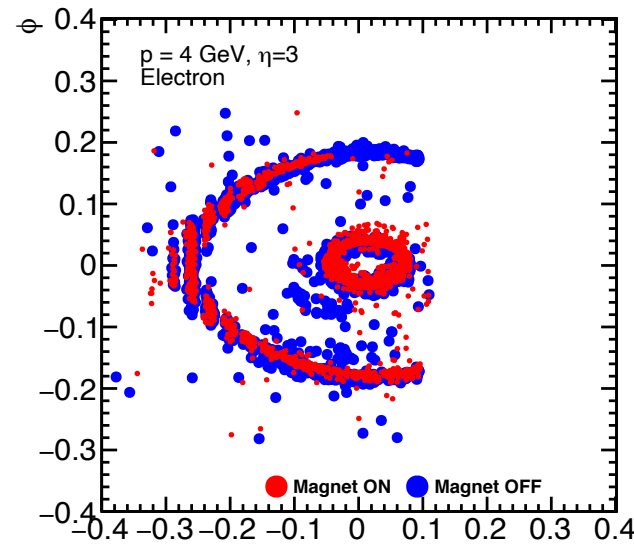
● Magnet ON
● Magnet OFF

18

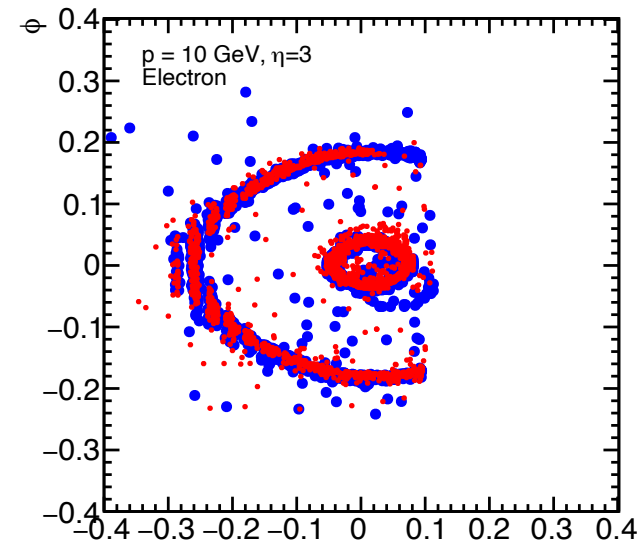
$p = 1$ GeV



$p = 4$ GeV

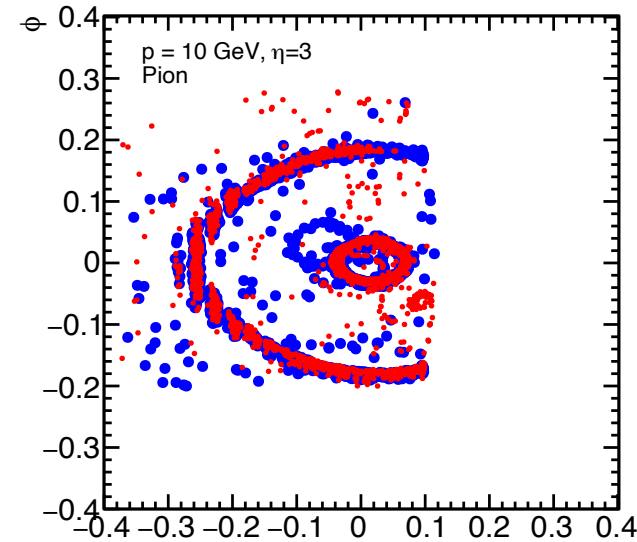
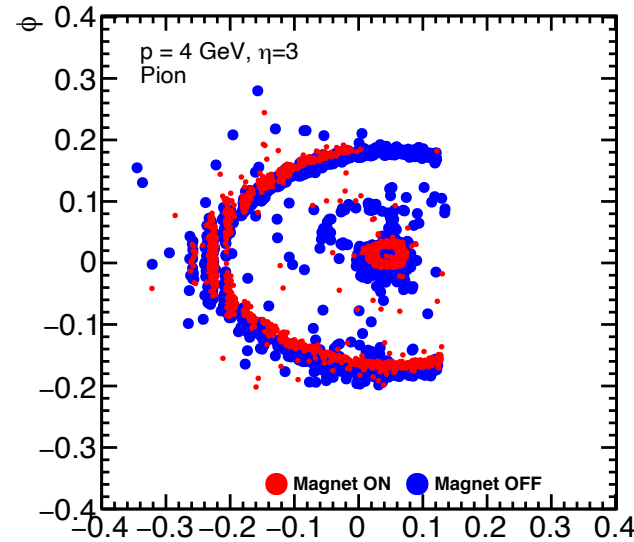
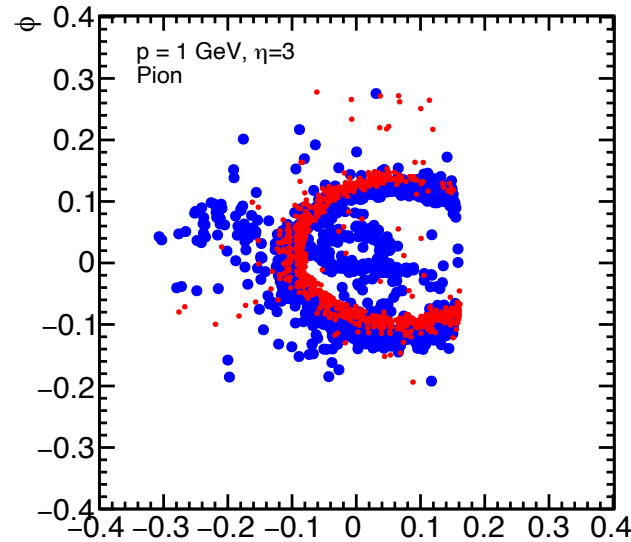


$p = 10$ GeV

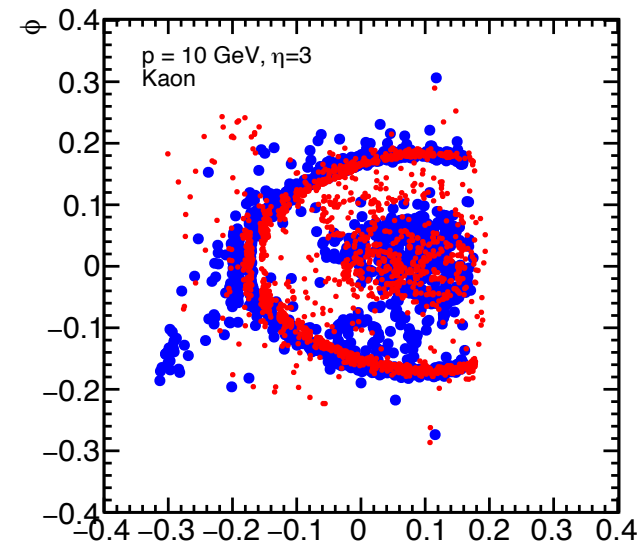
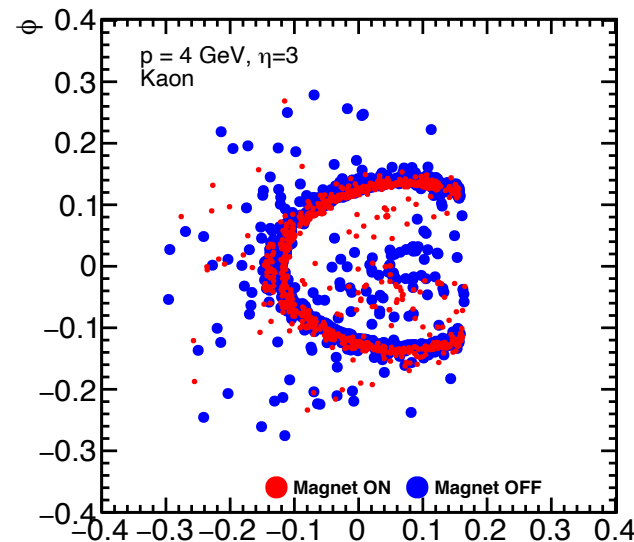
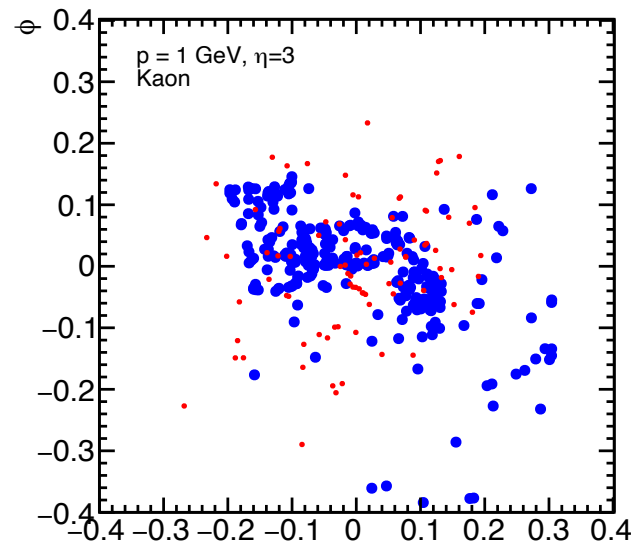


$p = 4$ GeV

e^-



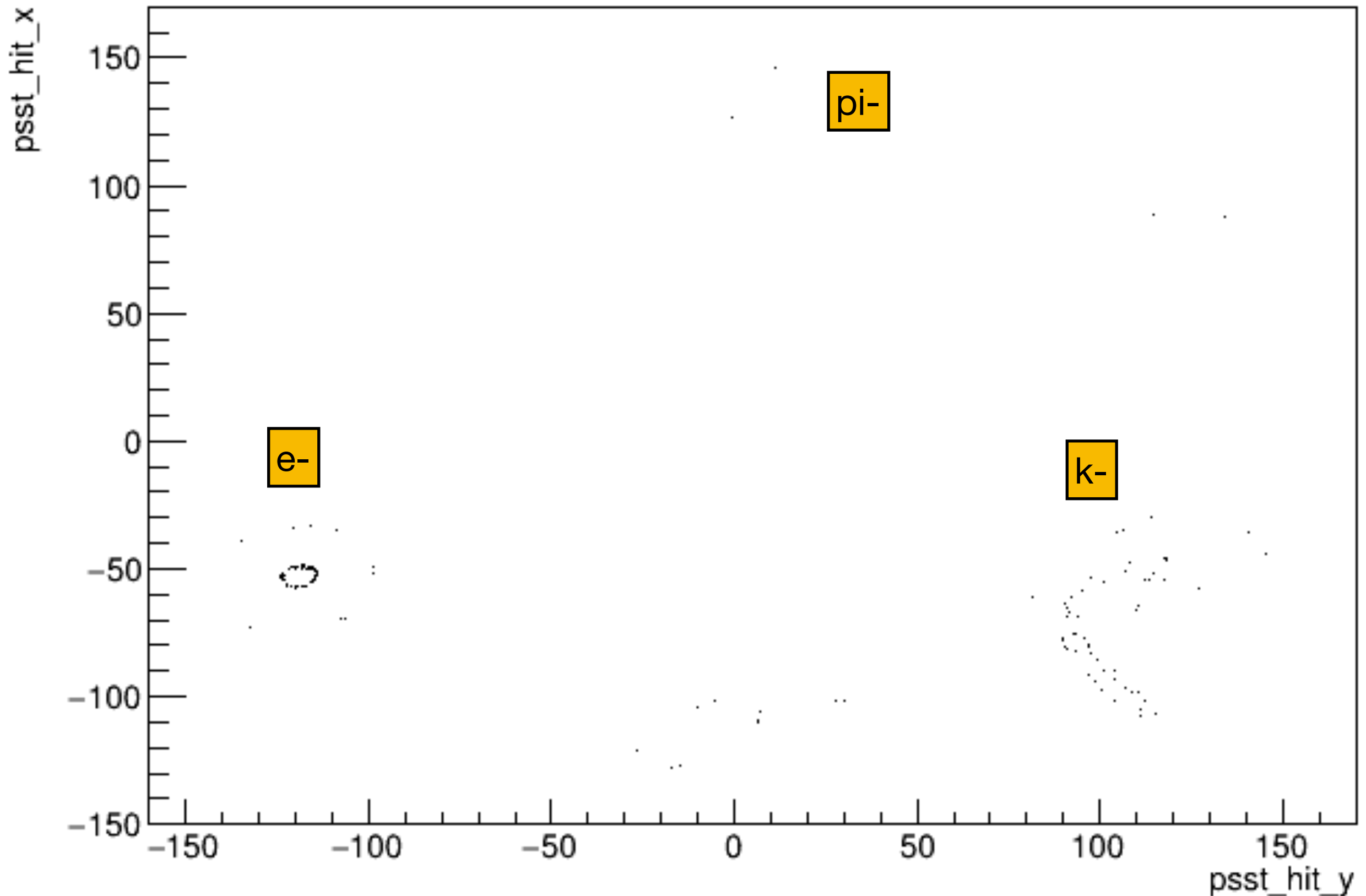
π^-



K^-

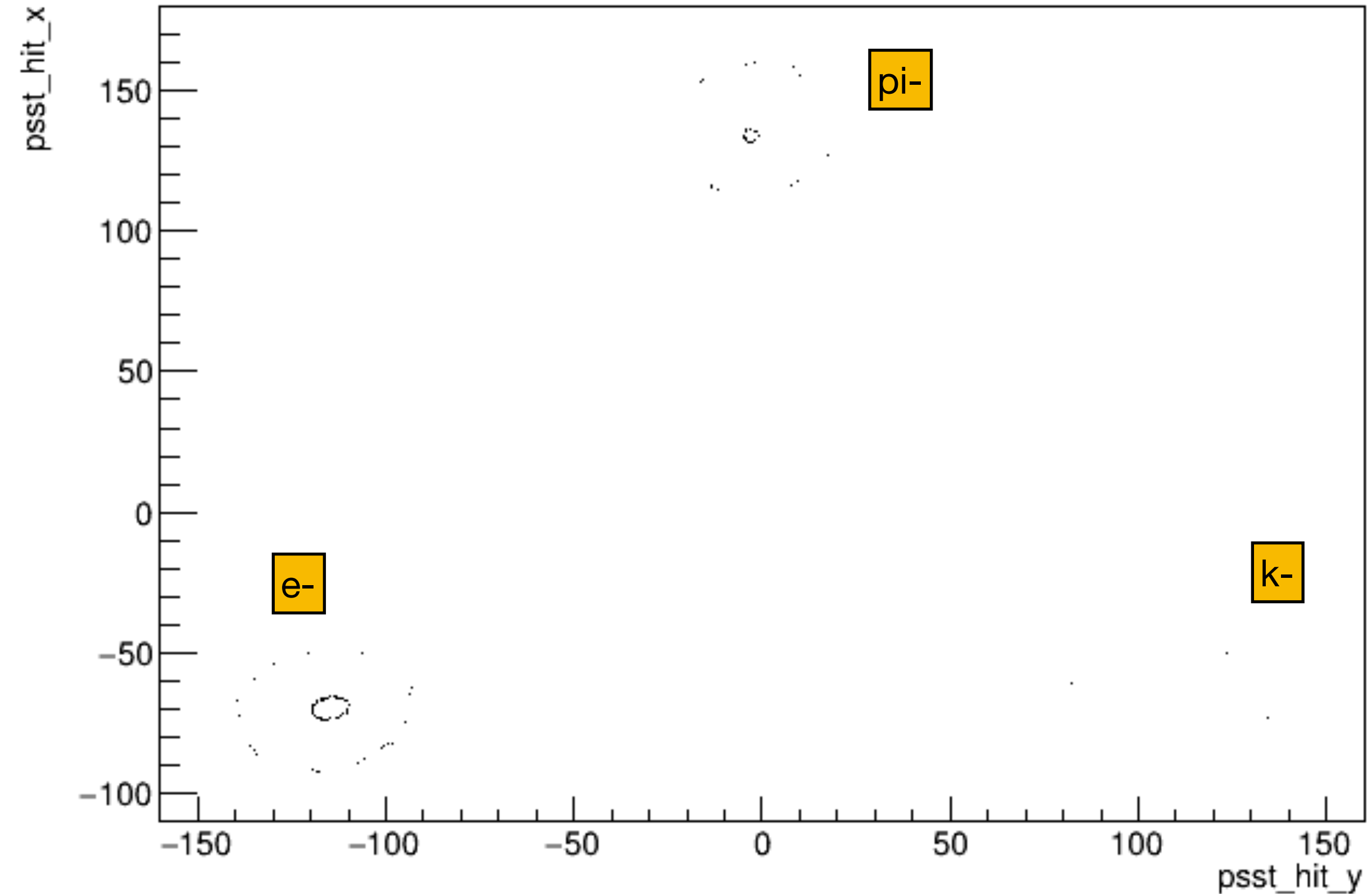
Single event

psst_hit_x:psst_hit_y



Single event

psst_hit_x:psst_hit_y



Single event

psst_hit_x:psst_hit_y

