

# Target Shielding Redesign

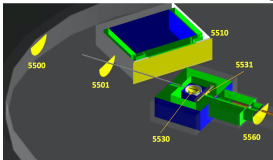
Ciprian Gal, Tao Ye, Zhongling Ji, Zuhail Seyma Demiroglu

11 Feb, 2021

# Reminder: The updated geometry

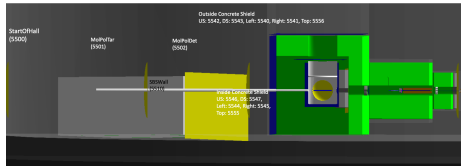
## Slides from Ciprian Gal et al.

### Modifications made around target



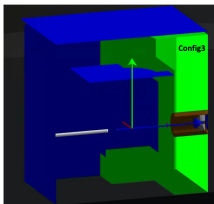
- Left all previous detectors alone
  - The hope is to remove them at some point later
- Added:
  - sphere detector around target
  - Plane DS of the target lead wall
  - Plane DS of US toroid (should be made kryptonite)
  - Plane US of the sbs bunker
  - Plane around moller and entrance of the hall (named Compton)
  - Plane detector at the moller polarimeter detector location
  - Use US outside shielding detector to evaluate harp/BPM radiation

### Updated geometry: Config2

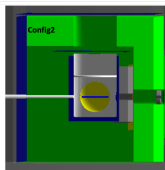


- Geometry updated by Sakib with replacement of the material of the Pb wall to concrete and increase from 40cm to 65cm (maximum)
- Remove upstream wall
- 2m hole on the room

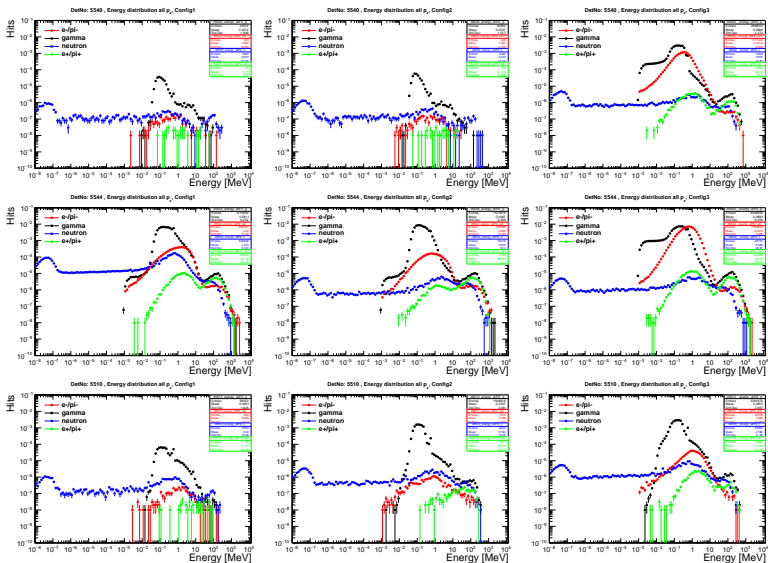
### Extended change (Config3)



- Decided to take a look at a configuration that doesn't have any shielding US of the center of the target
- The (brown) inner bore of the DS concrete is barite (36-50.5 cm)
- While this may turn out unrealistic I figured it would be instructive
  - SBS bunker analysis pending

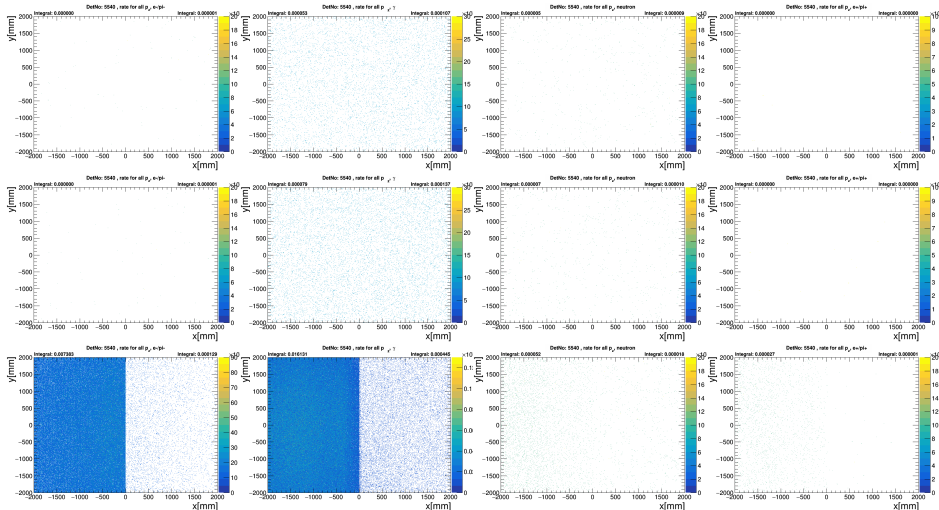


# Energy Distributions



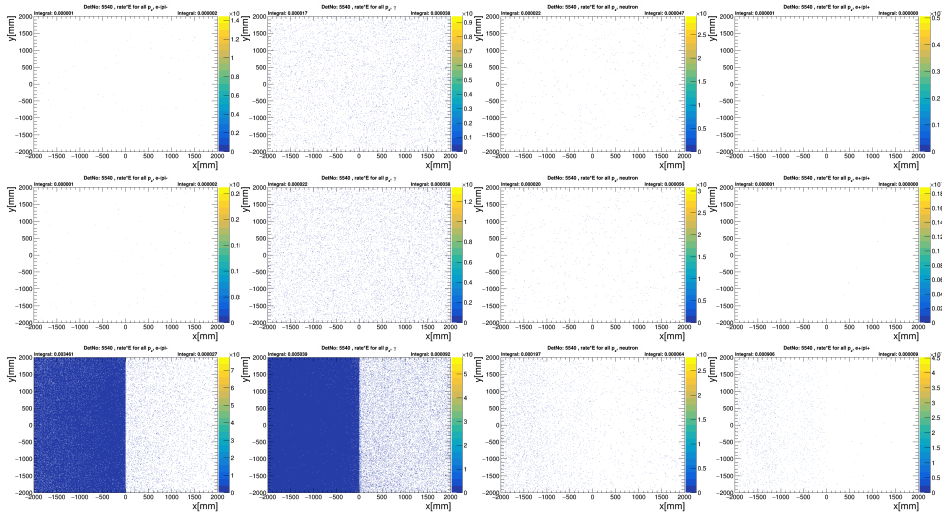
Top: Det5540, Middle: Det5544, Bottom: Det5510

# 2D Hit Distributions weighted by rate for all $p_z$ , config1/2/3 (Det5540)



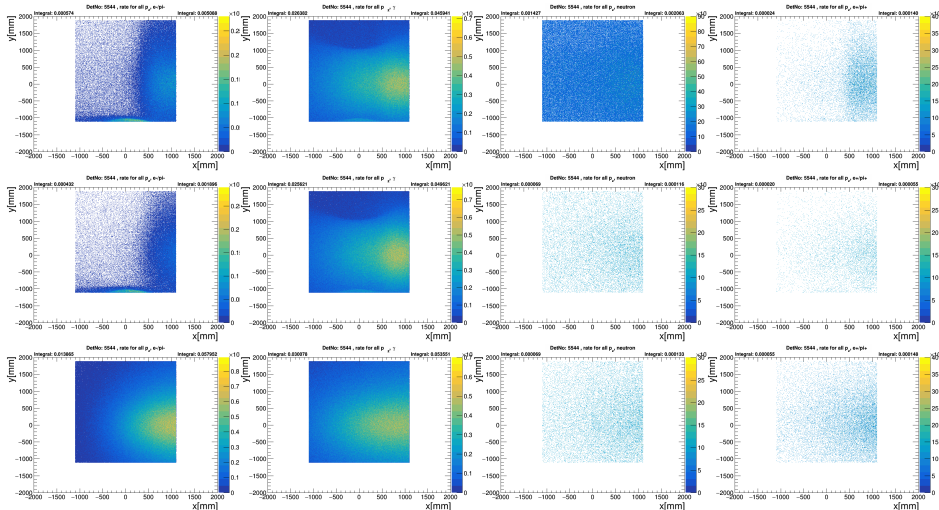
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate\*E for all $p_z$ , config1/2/3 (Det5540)



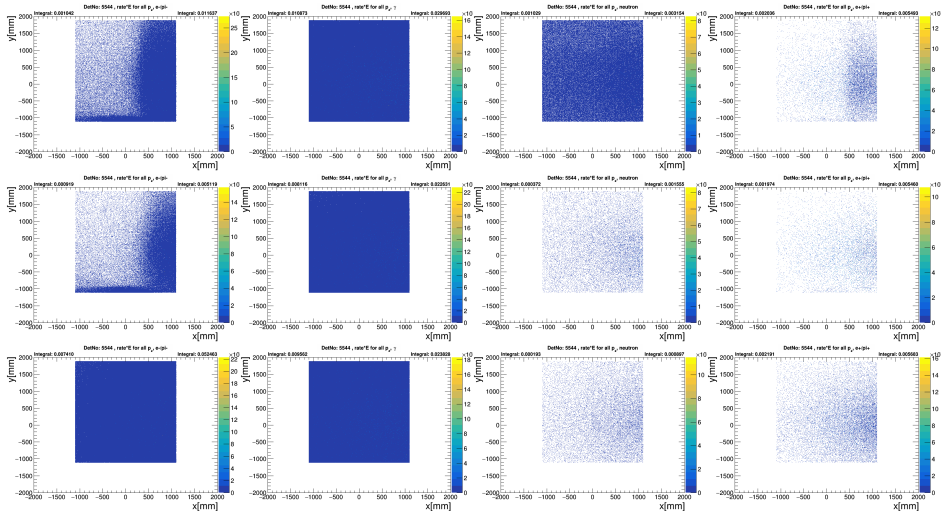
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate for all $p_z$ , config1/2/3 (Det5544)



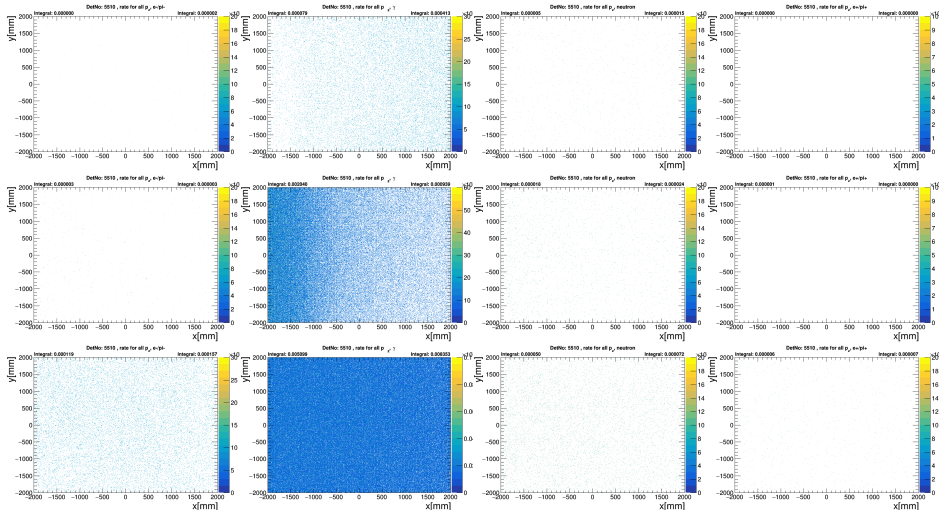
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate\*E for all $p_z$ , config1/2/3 (Det5544)



Top: Config1, Middle: Config2, Bottom: Config3

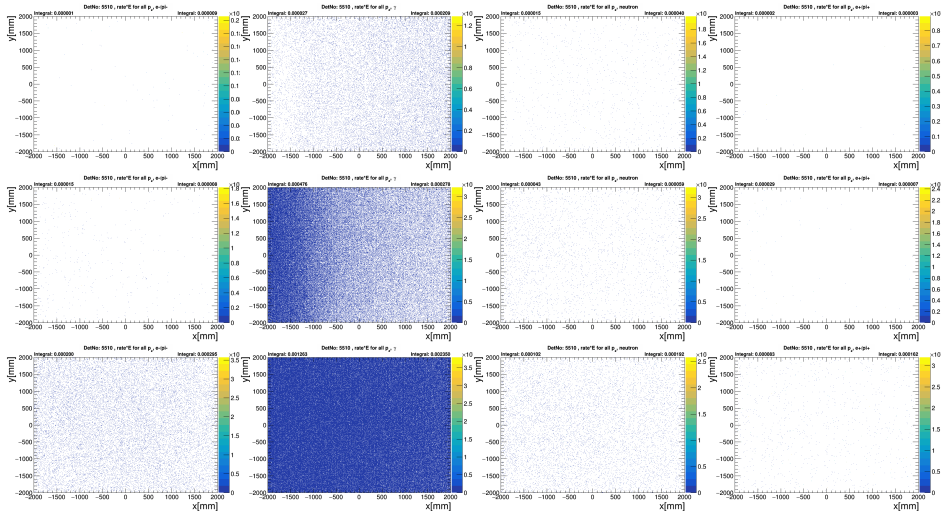
# 2D Hit Distributions weighted by rate for all $p_z$ , config1/2/3 (Det5510)



Top: Config1, Middle: Config2, Bottom: Config3



# 2D Hit Distributions weighted by rate\*E for all $p_z$ , config1/2/3 (Det5510)

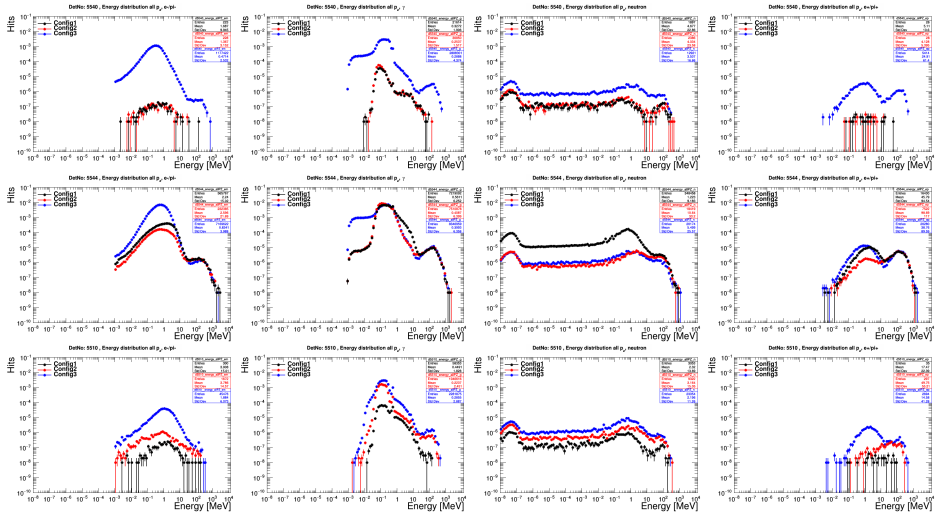


Top: Config1, Middle: Config2, Bottom: Config3

- Removal of the US wall increases photon contribution for the SBS bunker. It also increases the  $e^-/\pi^-$  and photon contributions for the inner/outside concrete shield.
  - We expect the Iron shielding for the SBS bunker to deal with the increase that happens at low enough energy.
- Removal of Pb-wall decreases neutron contribution for the inner concrete shield.

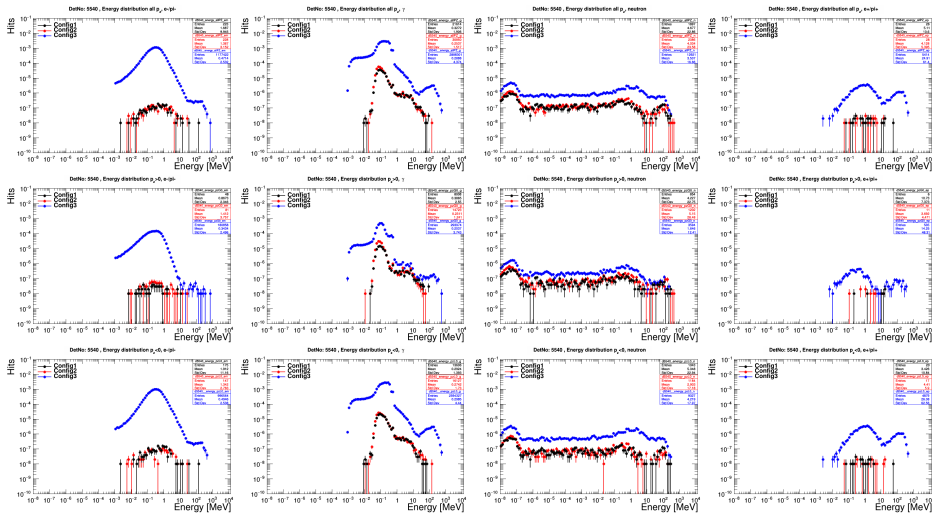
# Backup

# Energy Distributions v1

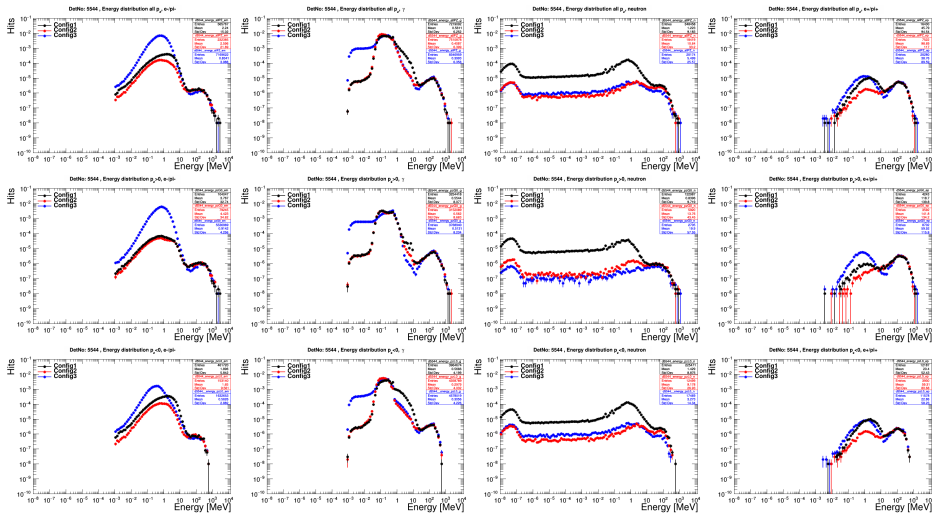


Top: Det5540, Middle: Det5544, Bottom: Det5510

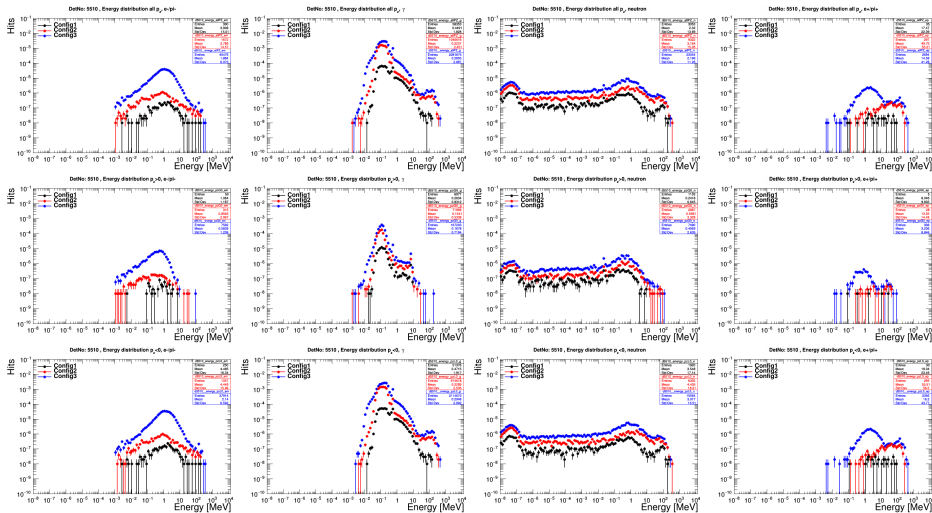
# Energy Distributions (Det5540)



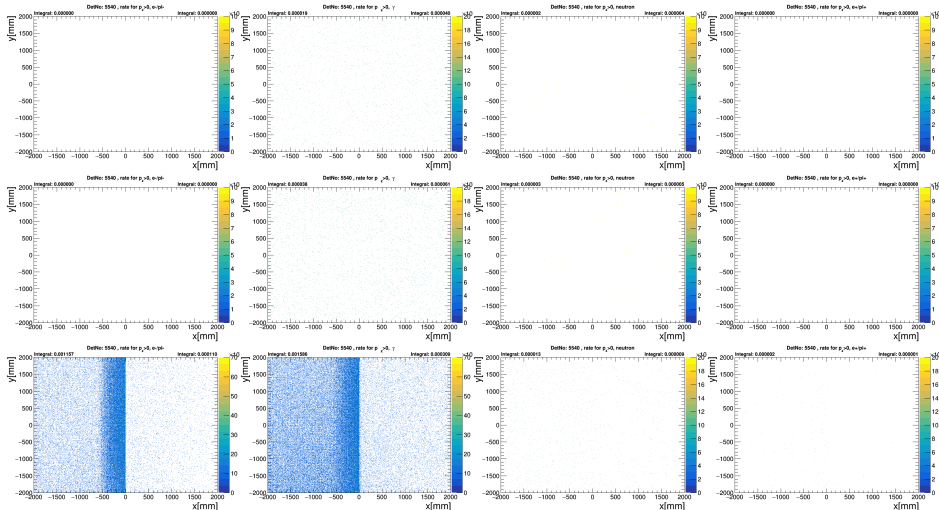
# Energy Distributions (Det5544)



# Energy Distributions (Det5510)



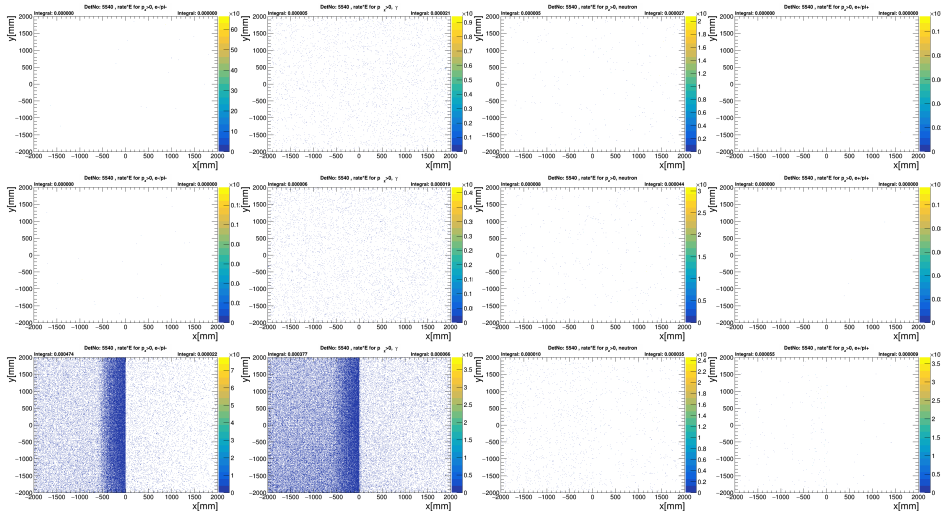
# 2D Hit Distributions weighted by rate, $p_z > 0$ , config1/2/3 (Det5540)



Top: Config1, Middle: Config2, Bottom: Config3

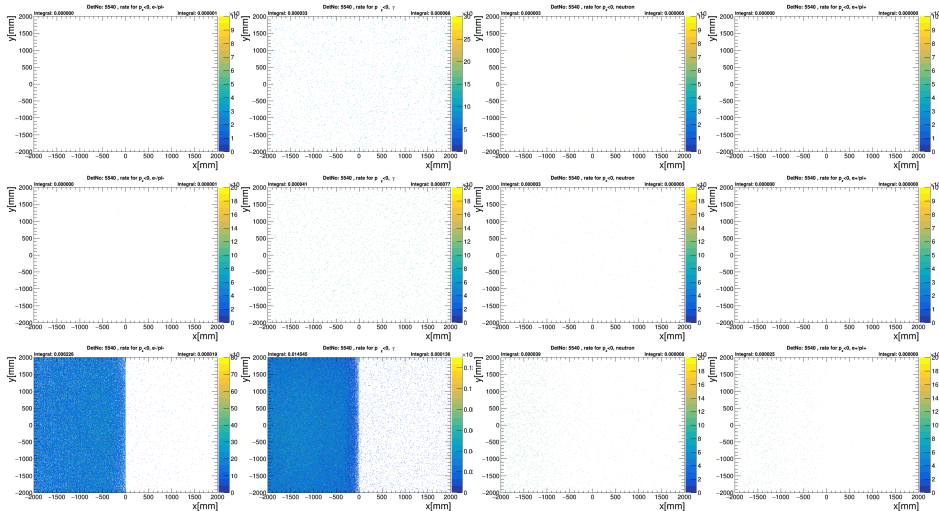


# 2D Hit Distributions weighted by rate\*E for $p_z > 0$ , config1/2/3 (Det5540)



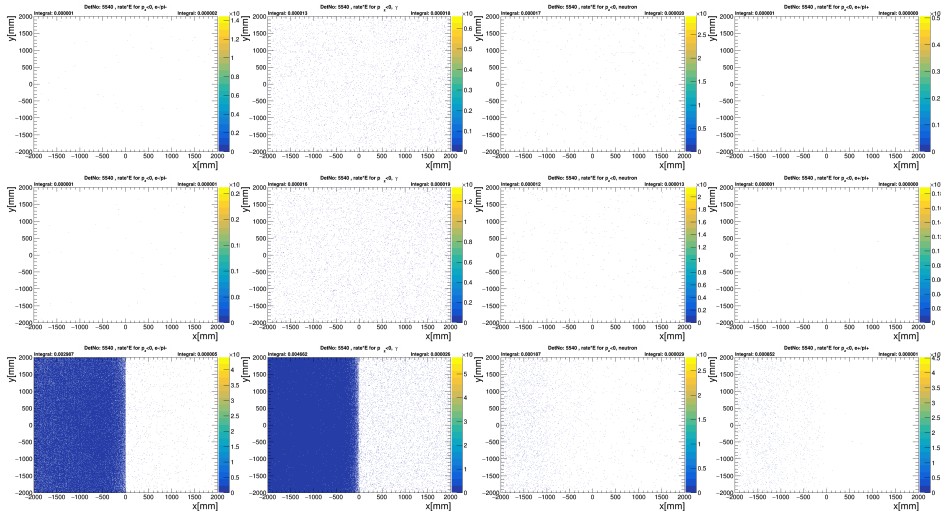
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate for $p_z < 0$ , config1/2/3 (Det5540)



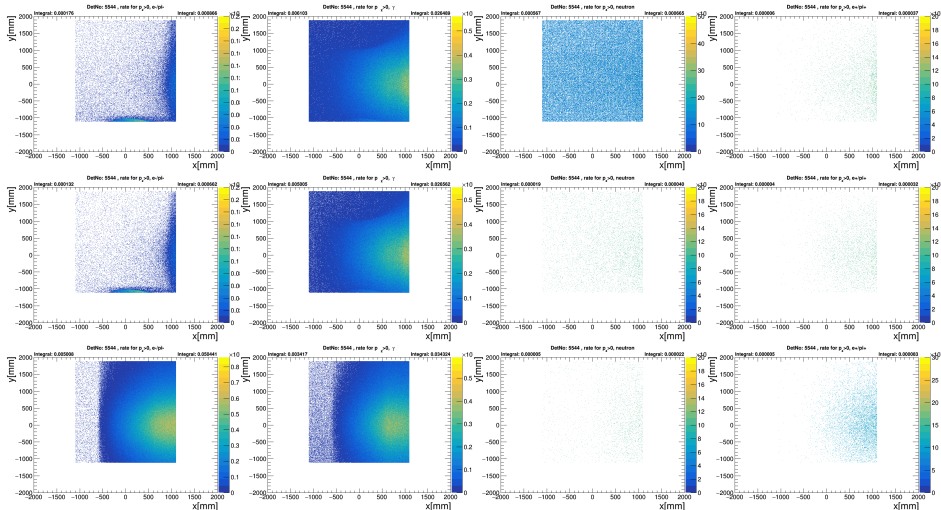
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate\*E for $p_z < 0$ , config1/2/3 (Det5540)



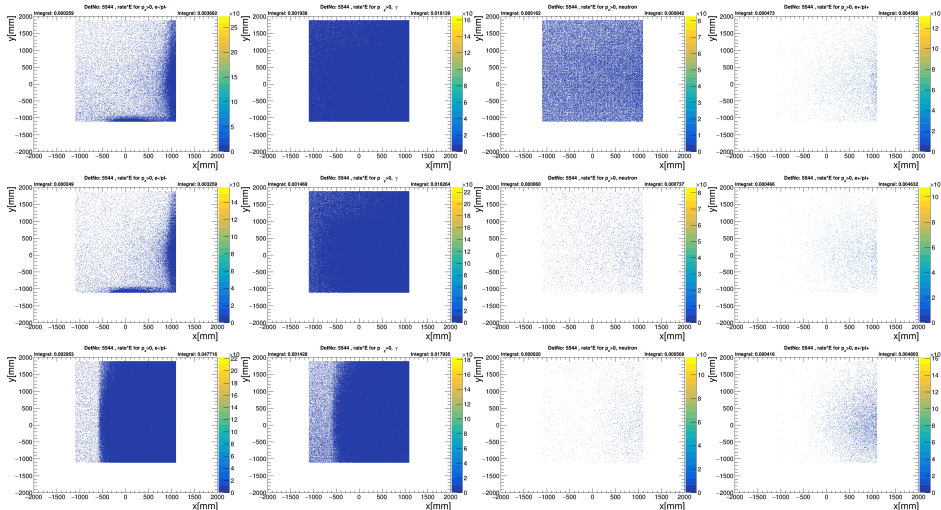
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate, $p_z > 0$ , config1/2/3 (Det5544)



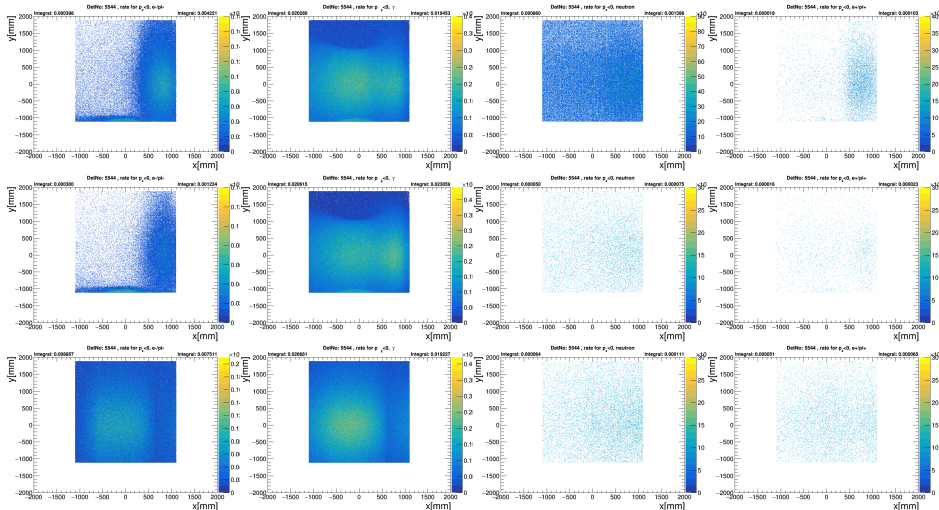
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate\*E for $p_z > 0$ , config1/2/3 (Det5544)



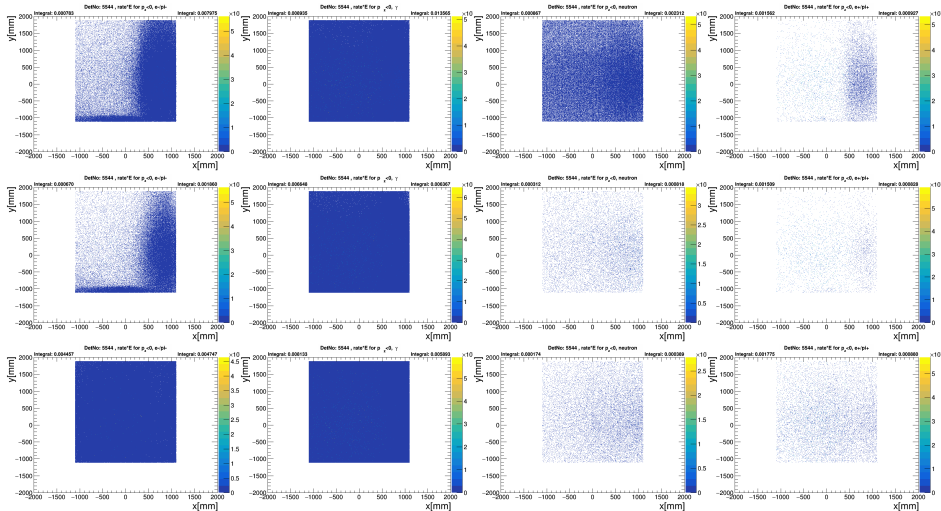
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate for $p_z < 0$ , config1/2/3 (Det5544)



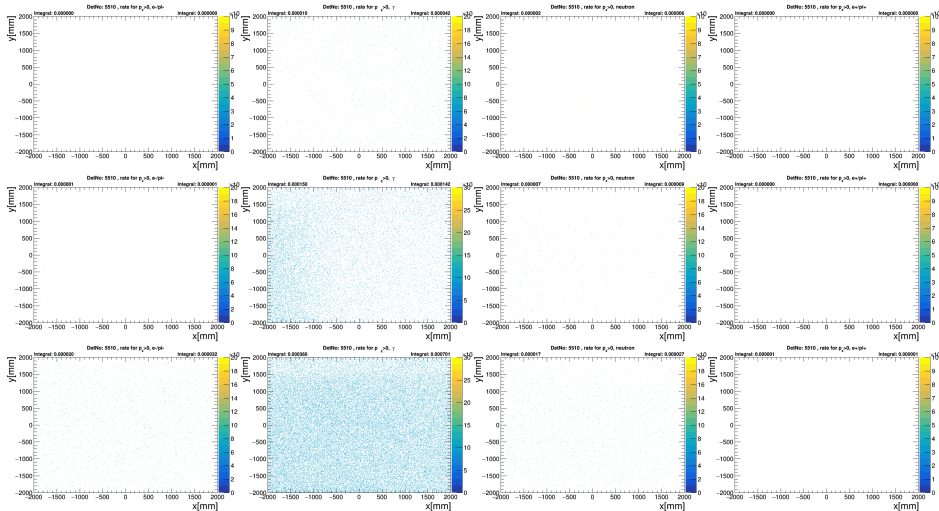
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate\*E for $p_z < 0$ , config1/2/3 (Det5544)



Top: Config1, Middle: Config2, Bottom: Config3

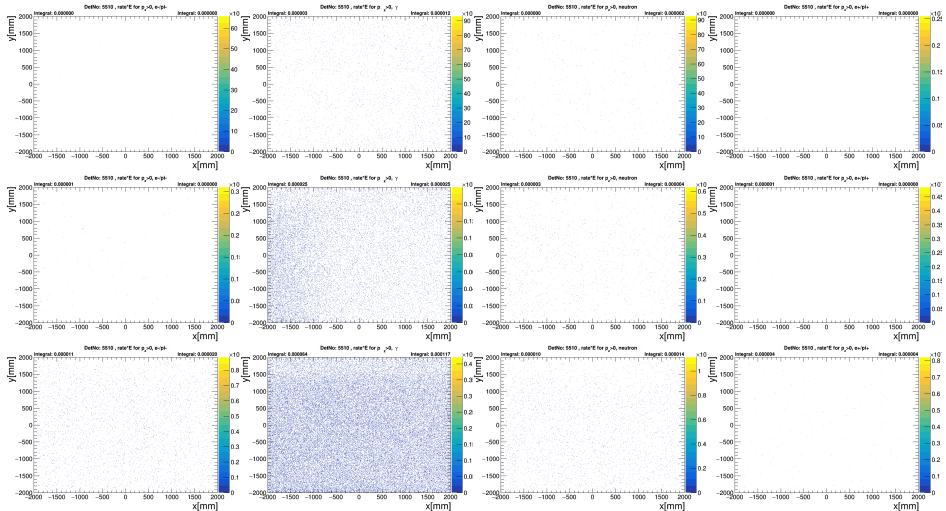
# 2D Hit Distributions weighted by rate, $p_z > 0$ , config1/2/3 (Det5510)



Top: Config1, Middle: Config2, Bottom: Config3

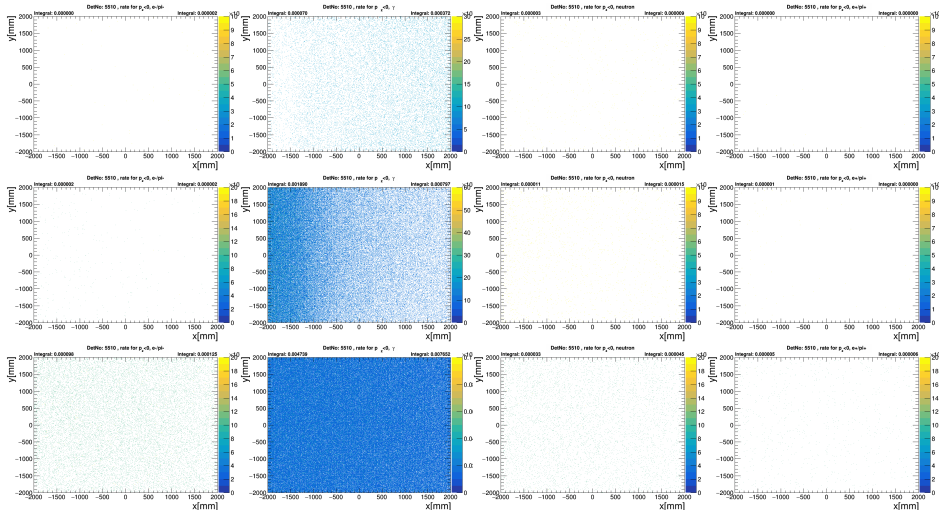


# 2D Hit Distributions weighted by rate\*E for $p_z > 0$ , config1/2/3 (Det5510)



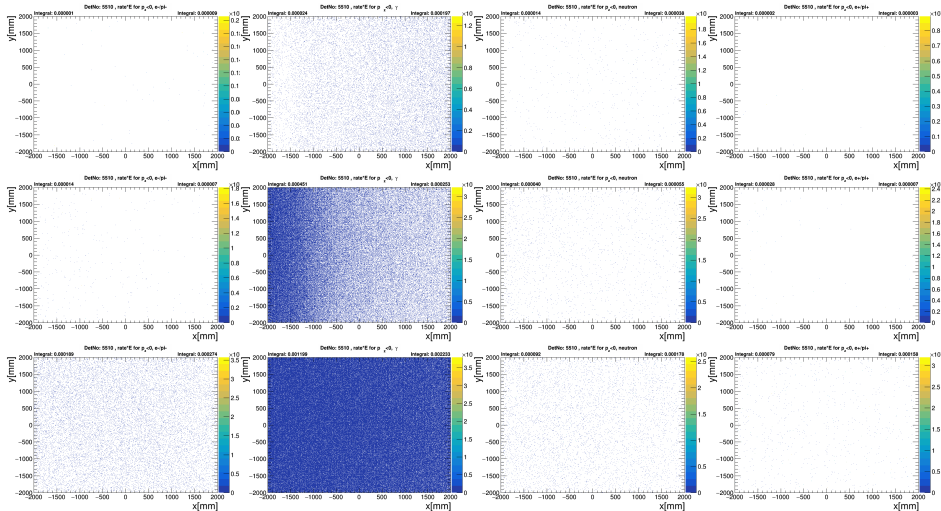
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate for $p_z < 0$ , config1/2/3 (Det5510)



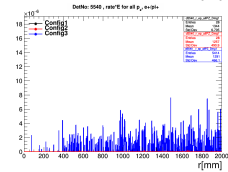
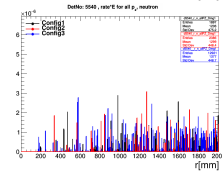
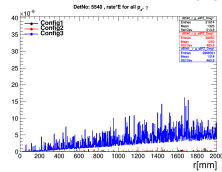
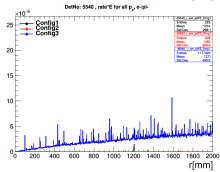
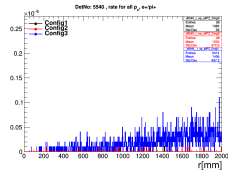
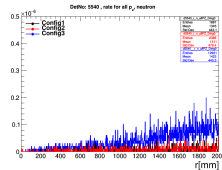
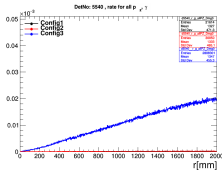
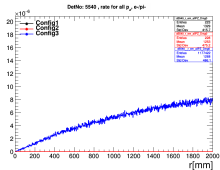
Top: Config1, Middle: Config2, Bottom: Config3

# 2D Hit Distributions weighted by rate\*E for $p_z < 0$ , config1/2/3 (Det5510)

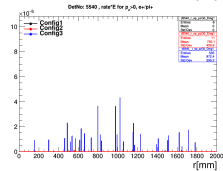
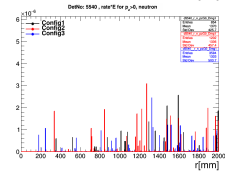
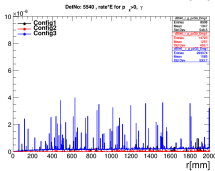
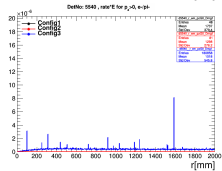
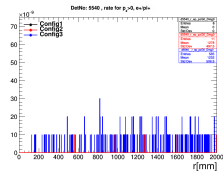
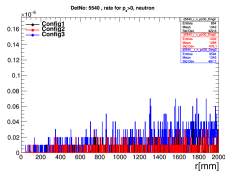
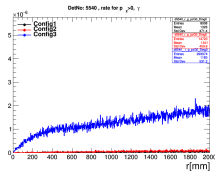
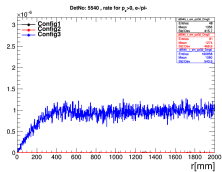


Top: Config1, Middle: Config2, Bottom: Config3

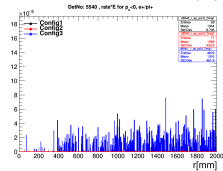
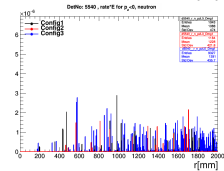
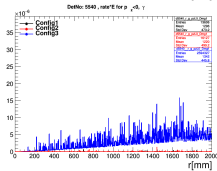
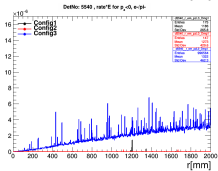
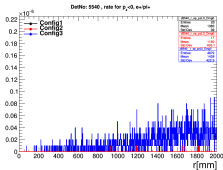
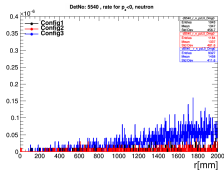
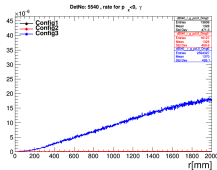
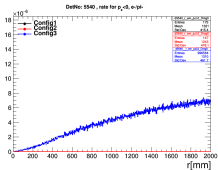
# Radial Distributions, all $p_z$ (Det5540)



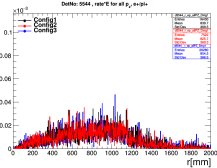
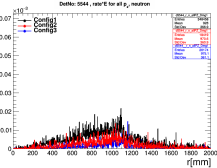
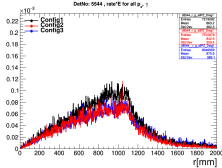
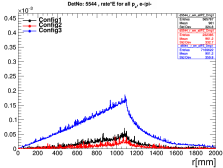
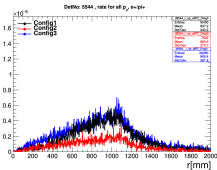
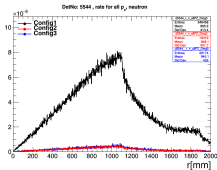
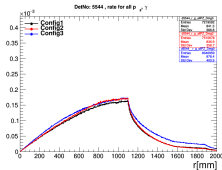
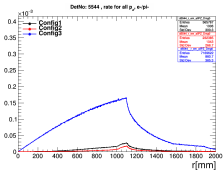
# Radial Distributions, $p_z > 0$ (Det5540)



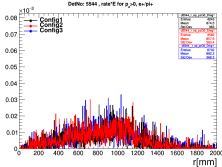
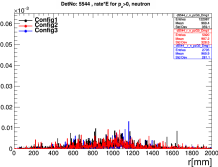
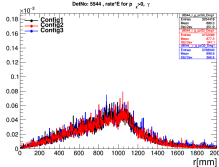
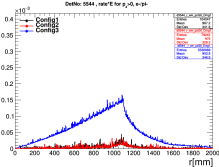
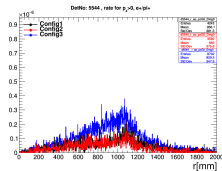
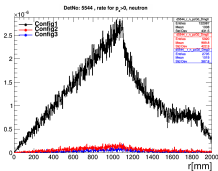
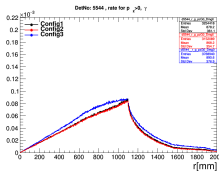
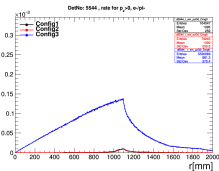
# Radial Distributions, $p_z < 0$ (Det5540)



# Radial Distributions, all $p_z$ (Det5544)

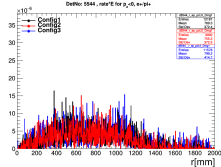
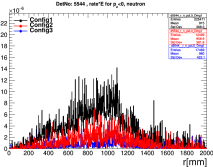
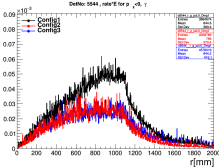
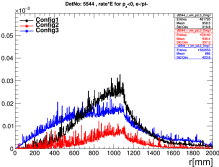
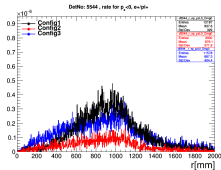
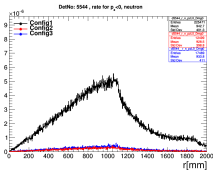
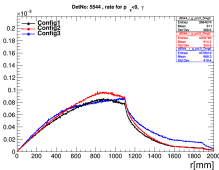
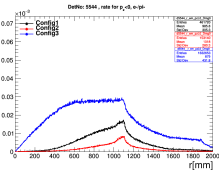


# Radial Distributions, $p_z > 0$ (Det5544)

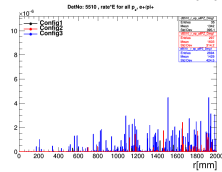
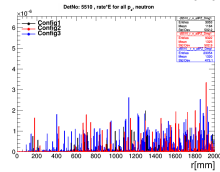
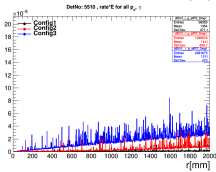
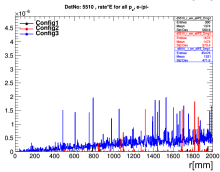
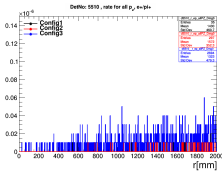
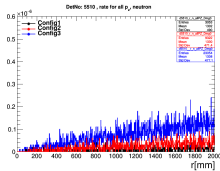
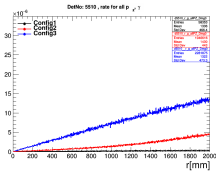
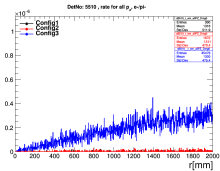




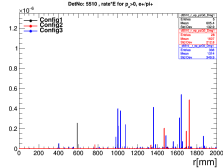
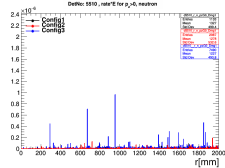
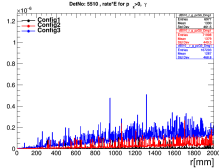
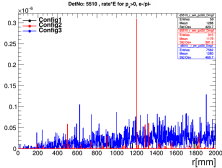
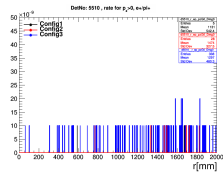
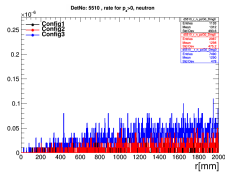
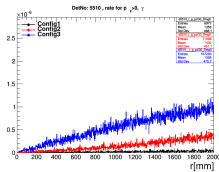
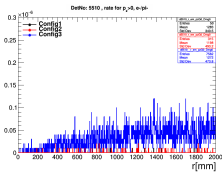
# Radial Distributions, $p_z < 0$ (Det5544)



# Radial Distributions, all $p_z$ (Det5510)



# Radial Distributions, $p_z > 0$ (Det5510)



# Radial Distributions, $p_z < 0$ (Det5510)

