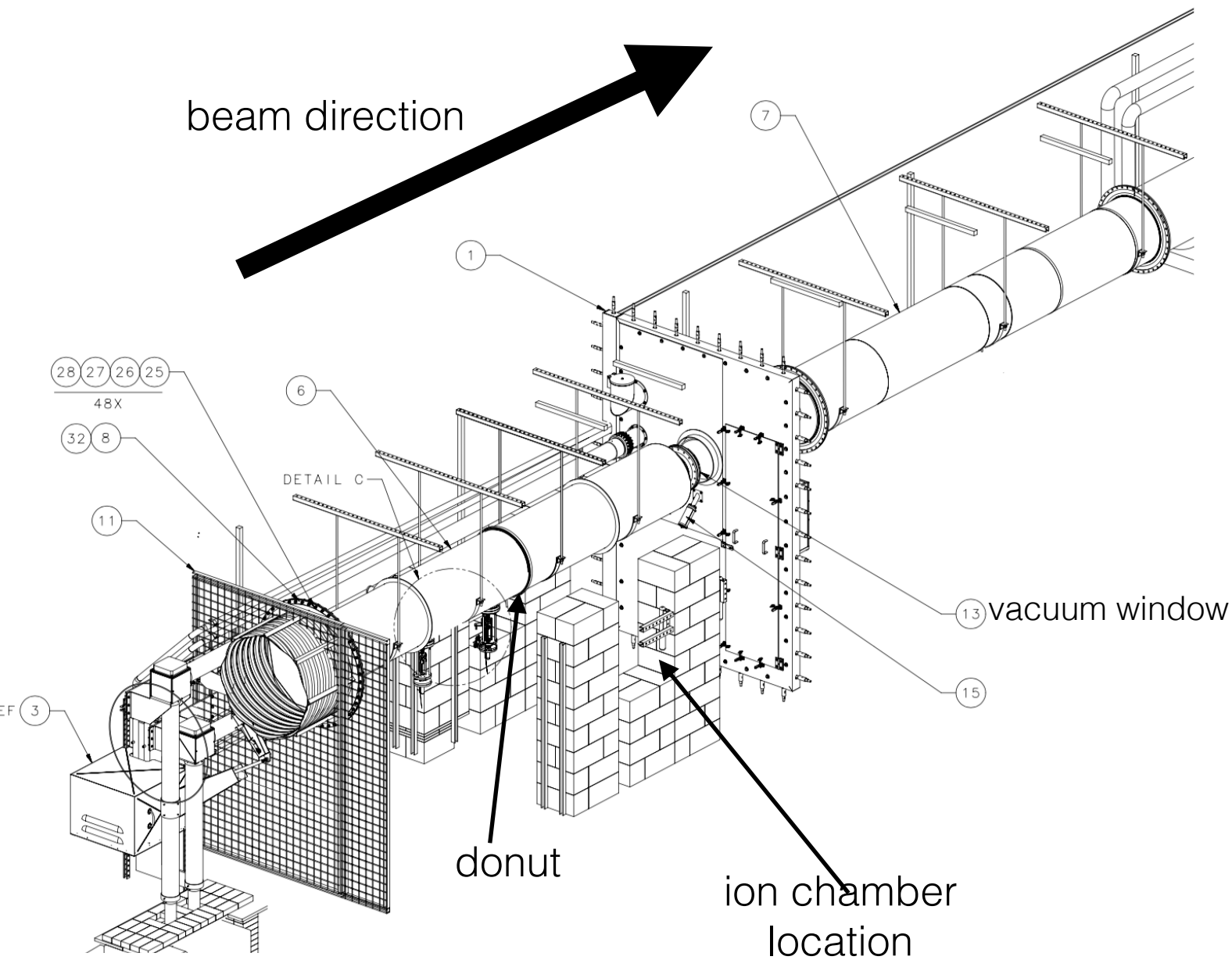


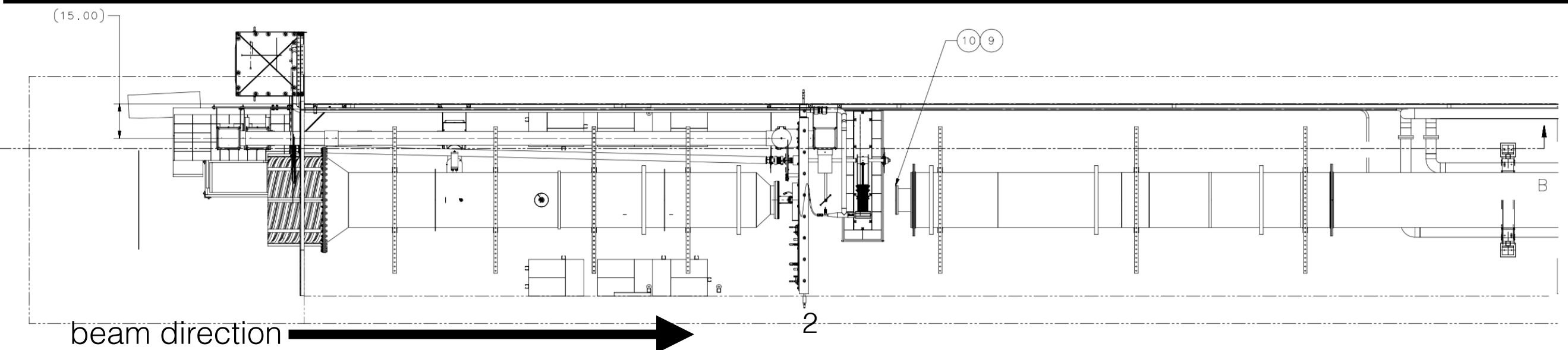
PREX Dump configuration

Ciprian Gal
UVa

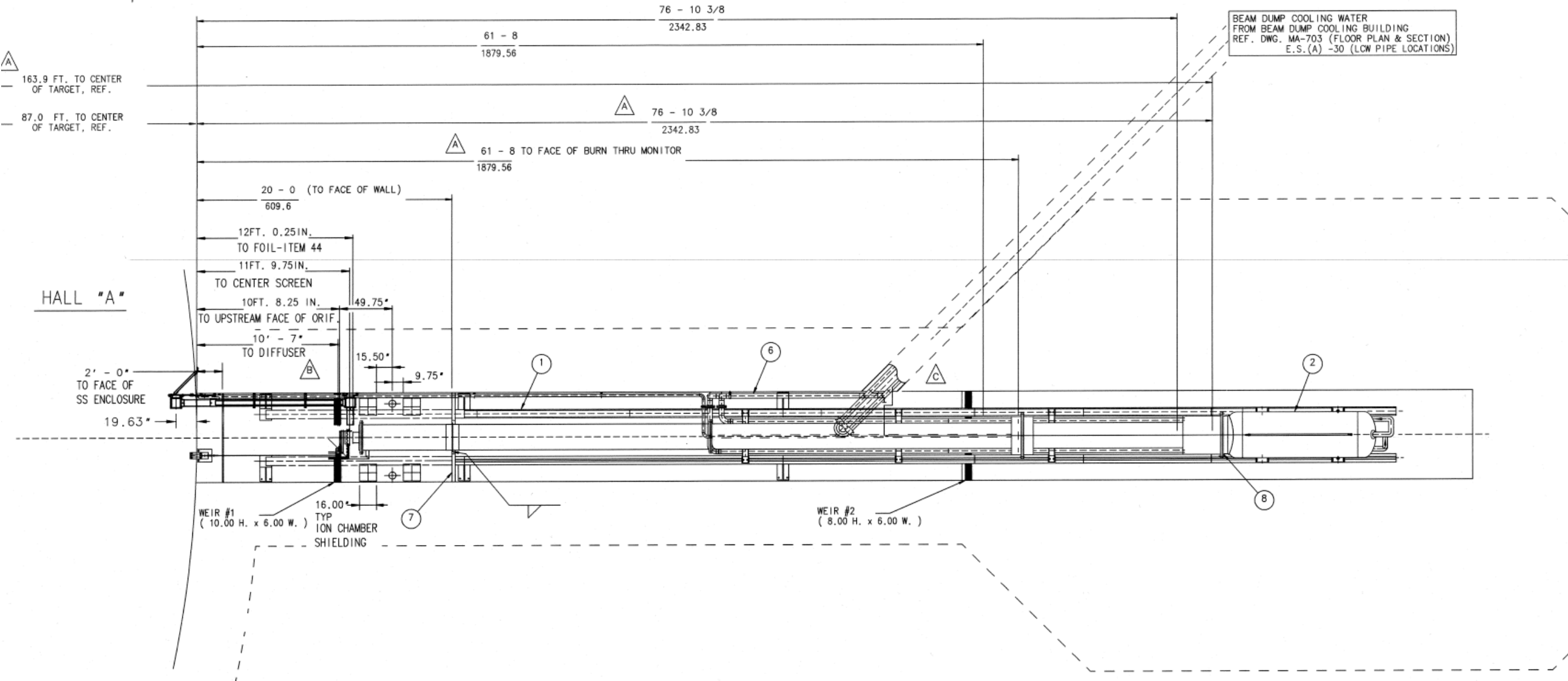
PREX 2 Dump configuration



- For PREX2/CREX we will not need to use the diffuser
- I have only implemented the beam pipe until the vacuum window and added the Al wall

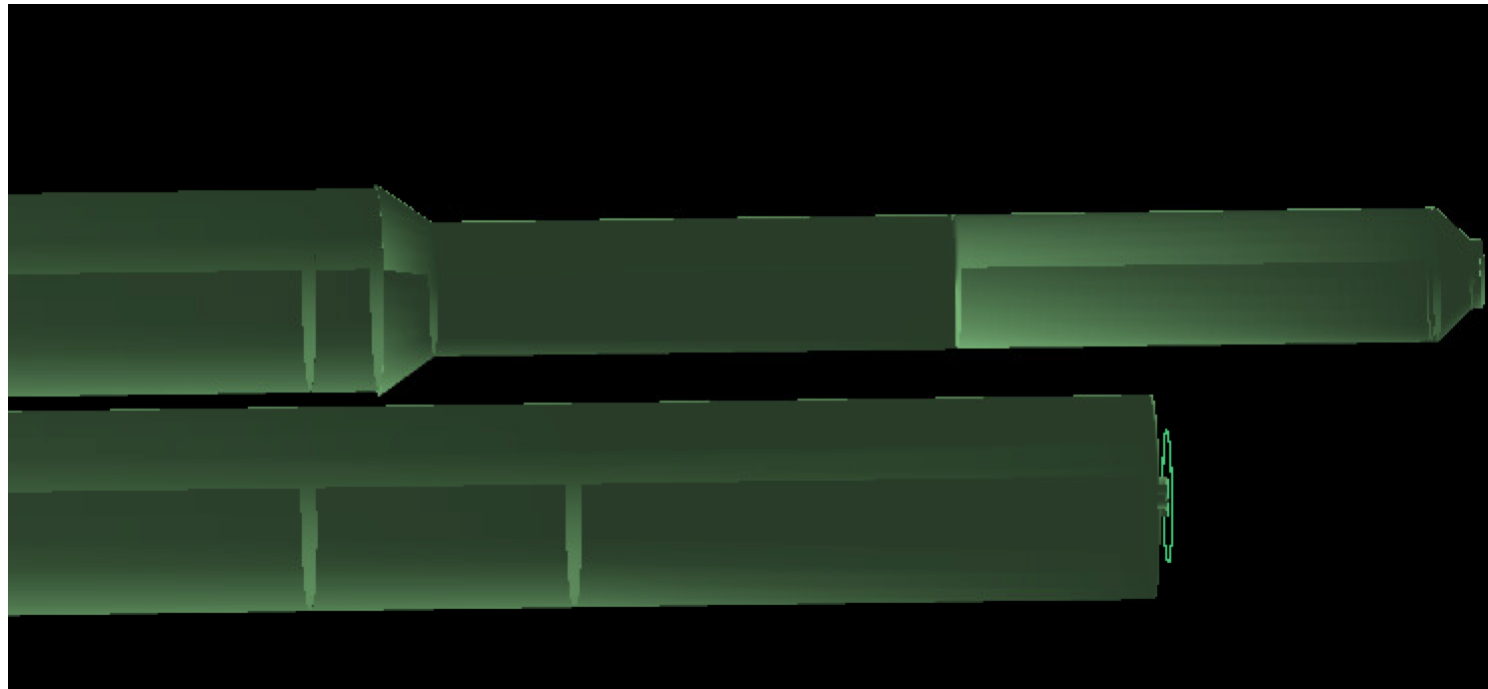


PREX 1 dump configuration

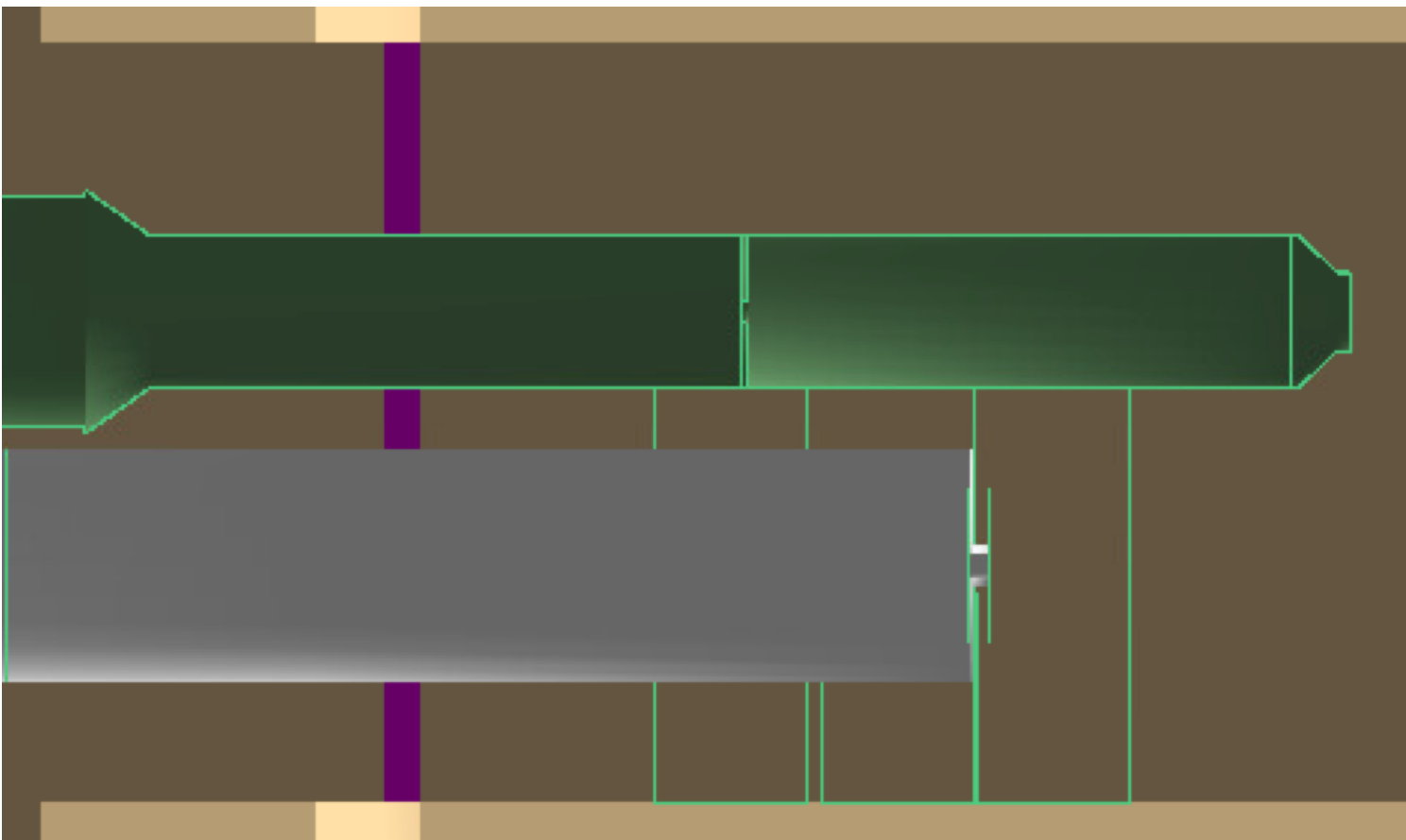


- Dump configuration was different than what we had in the simulation
- The beam pipe has an Aluminum aperture that is about 4in in diameter in about the same location as the donut is now

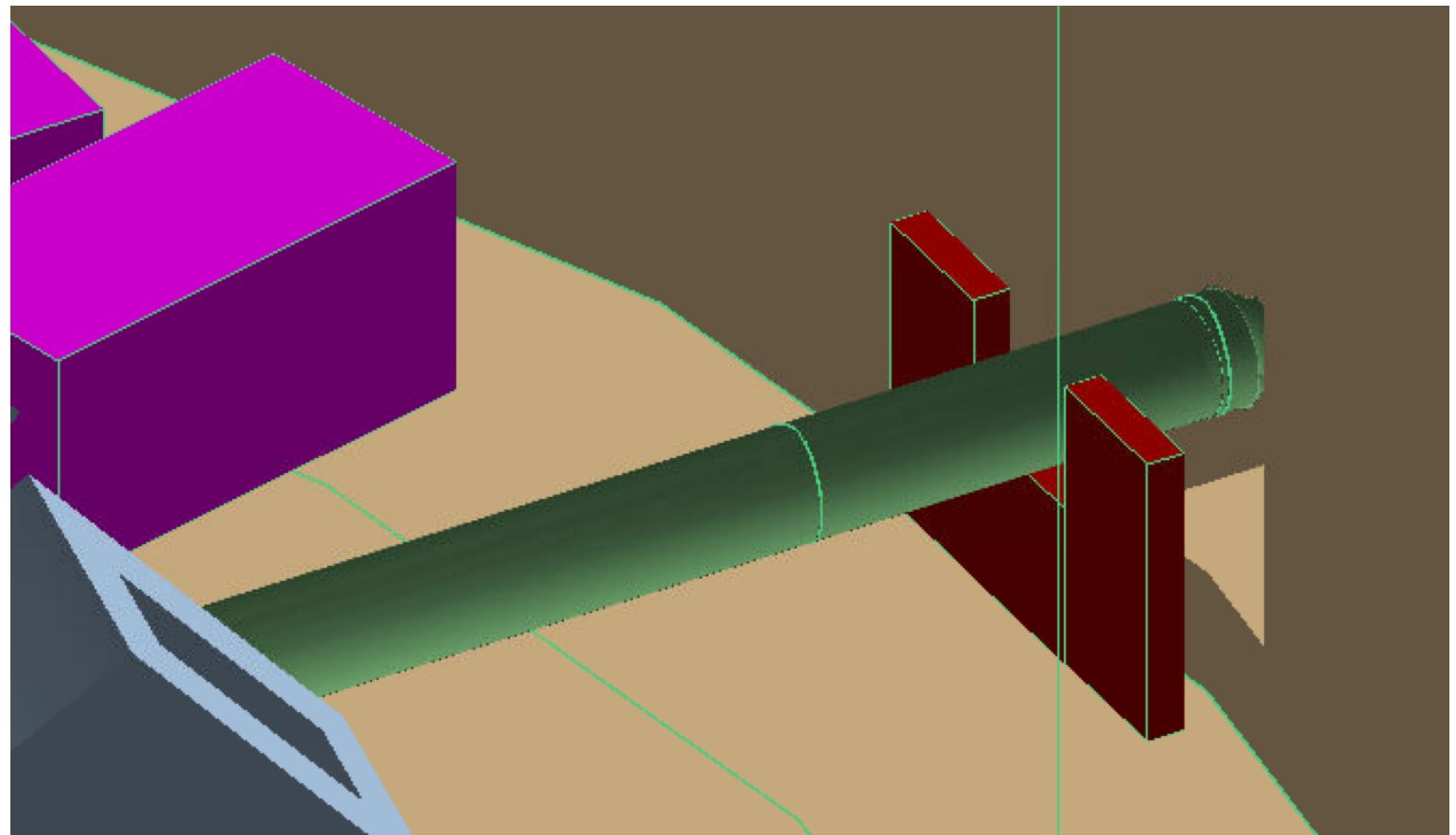
GDML implementation



- Furthermore Kent noticed that the neck down in my configuration didn't match the drawing (or reality)
- now the neck-down is right after the wall similarly to what we have in the hall

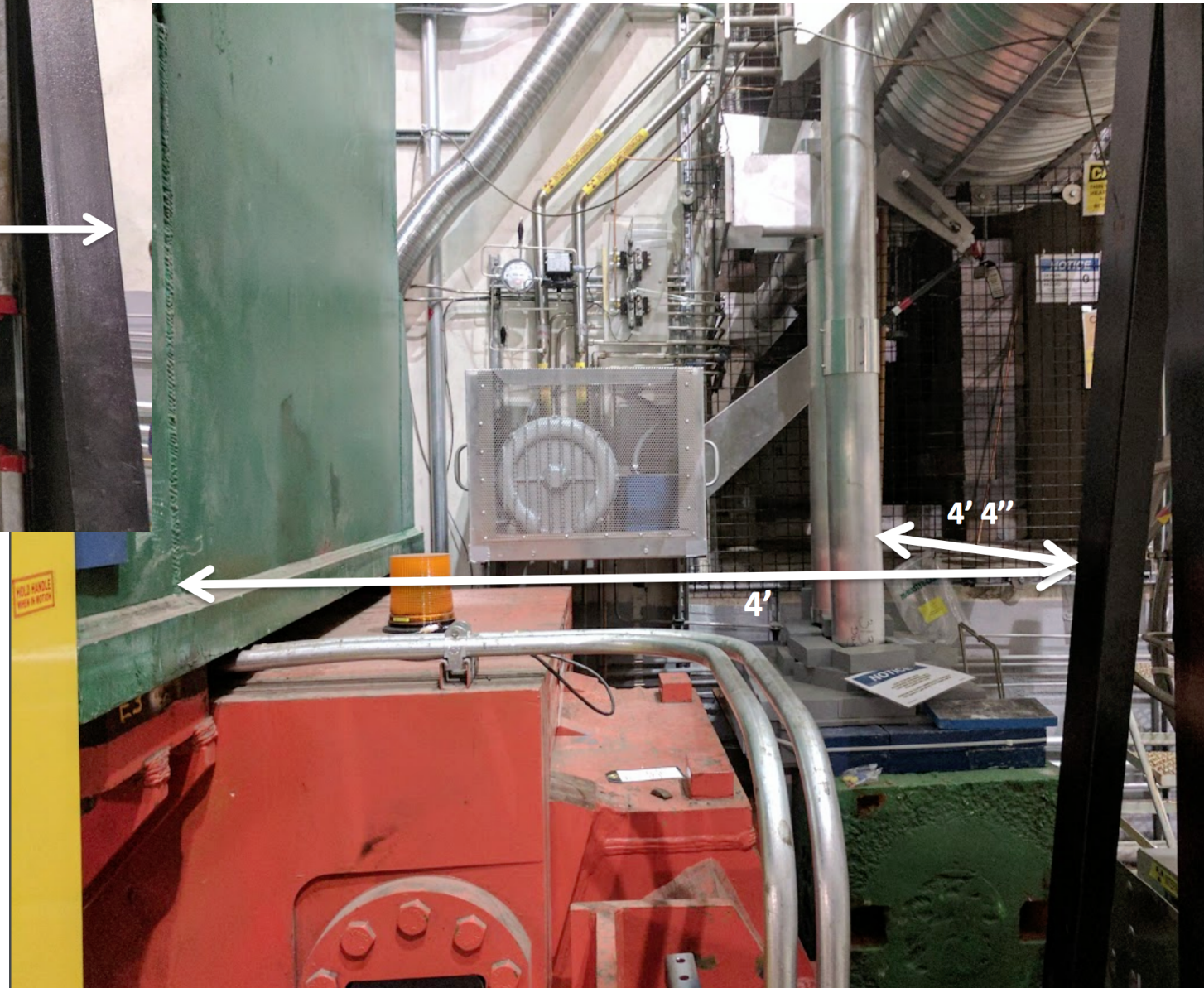
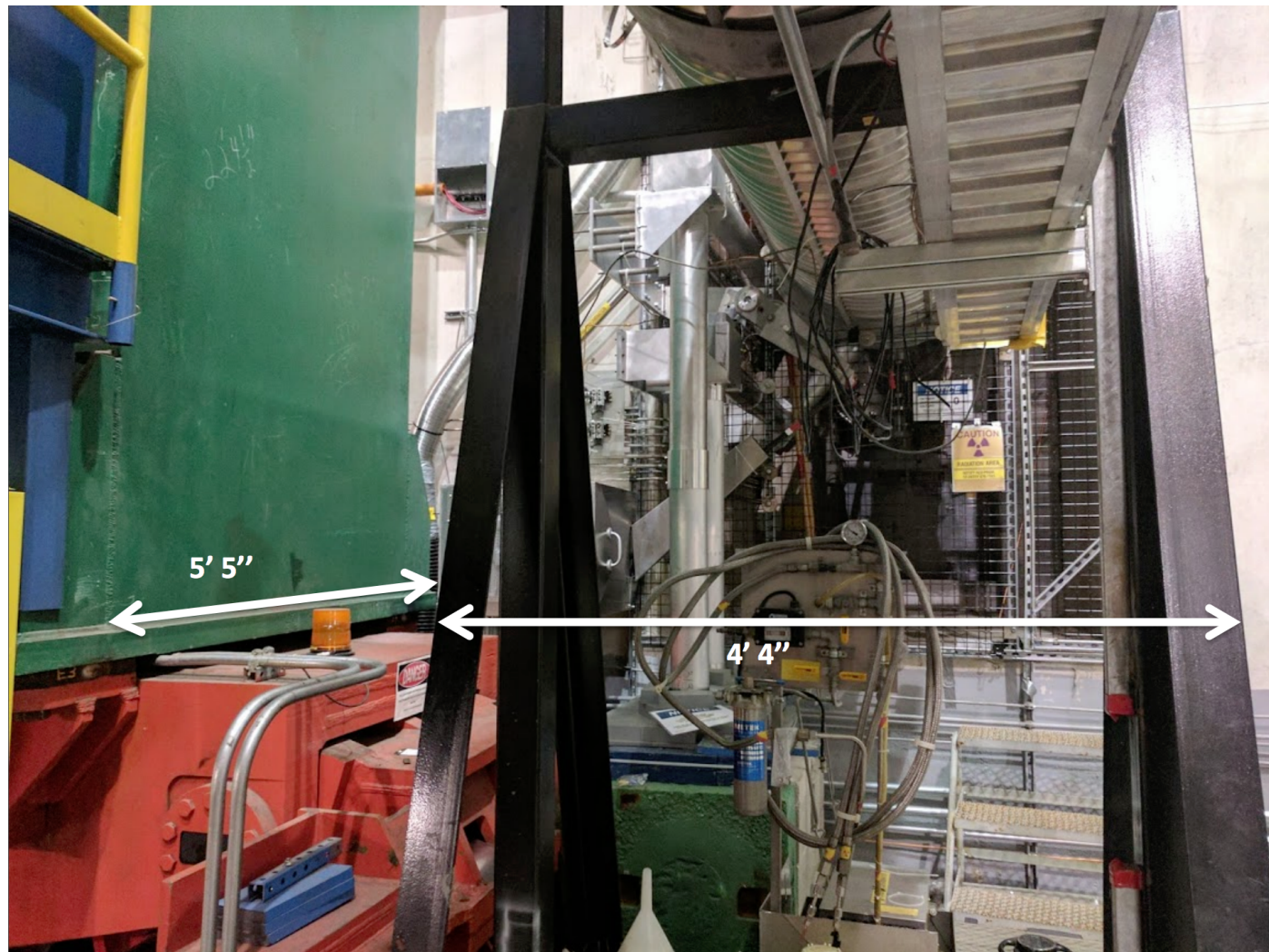


Shielding concept



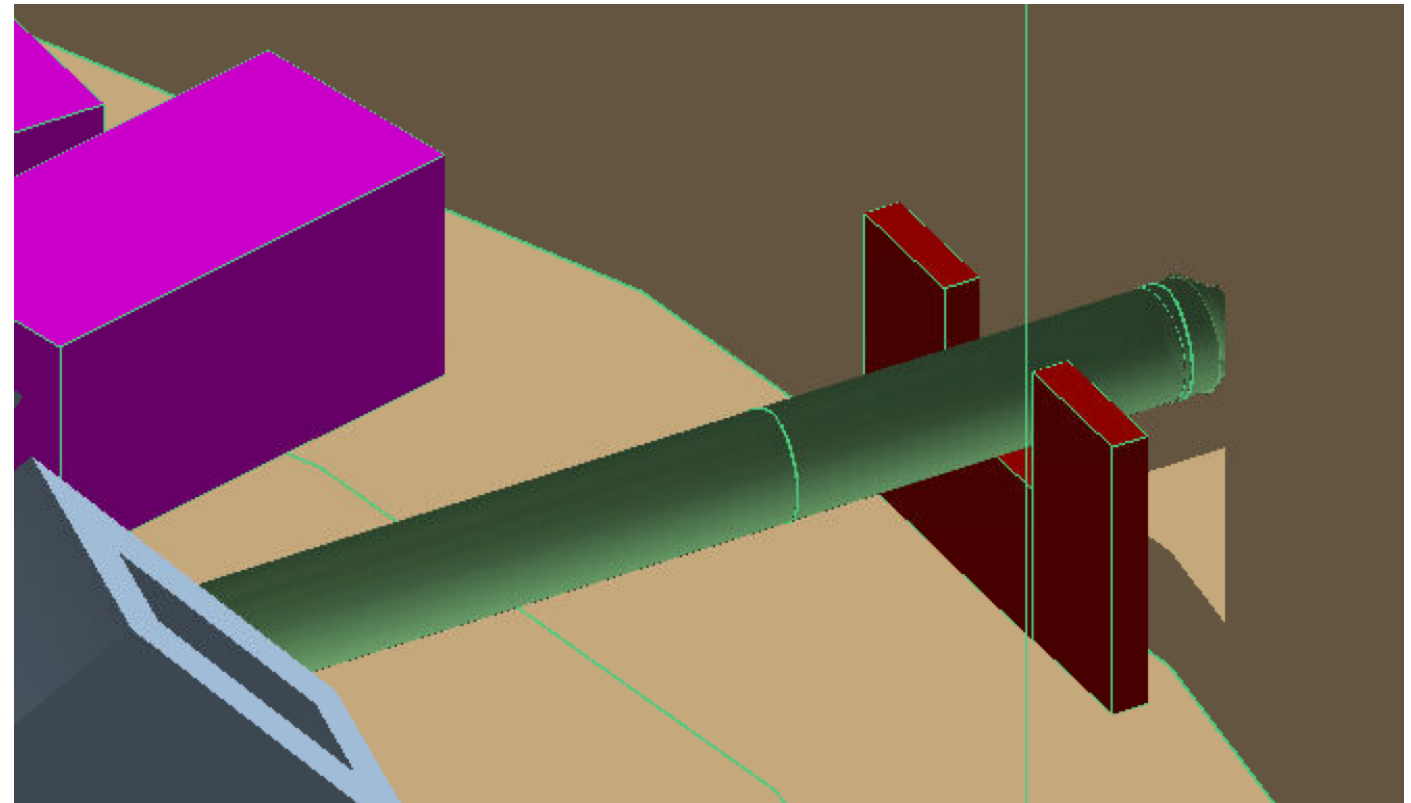
- Sanghwa, Dave and I went over to the hall and we made some measurement of the space available to us with the HRS parked in the 12.5 deg position
- I implemented 3 simple 1 foot thick shielding blocks in the simulation (ran for both concrete and Polyethylene)

Hall Configuration



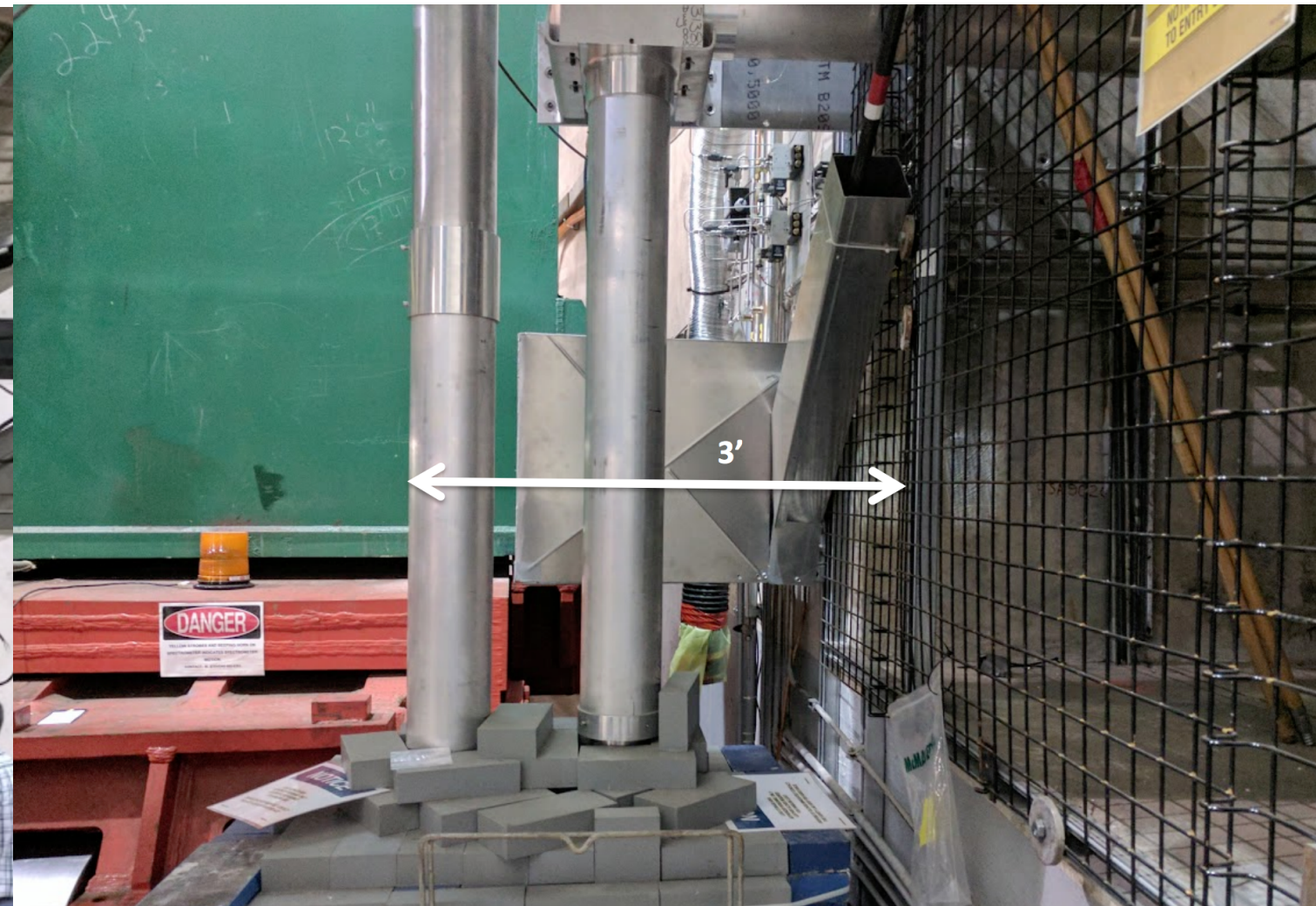
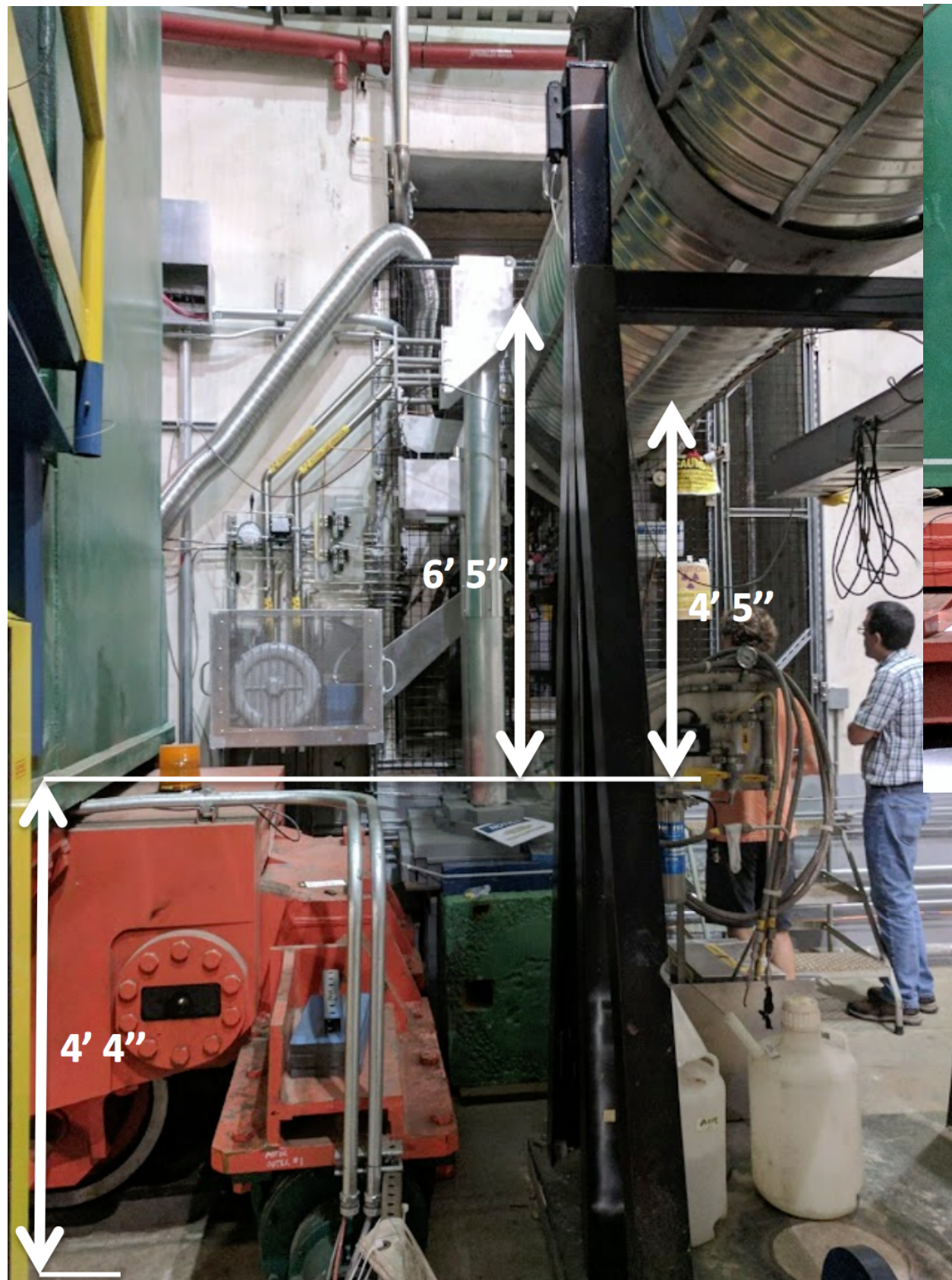
- 10 cm thick Steel wall (in green) is not present in our simulation

Hall Configuration



- 10 cm thick Steel wall (in green) is not present in our simulation
- moreover, the hrs “electronics box” we have now doesn’t cover the whole area where electronics exist and may be too forward

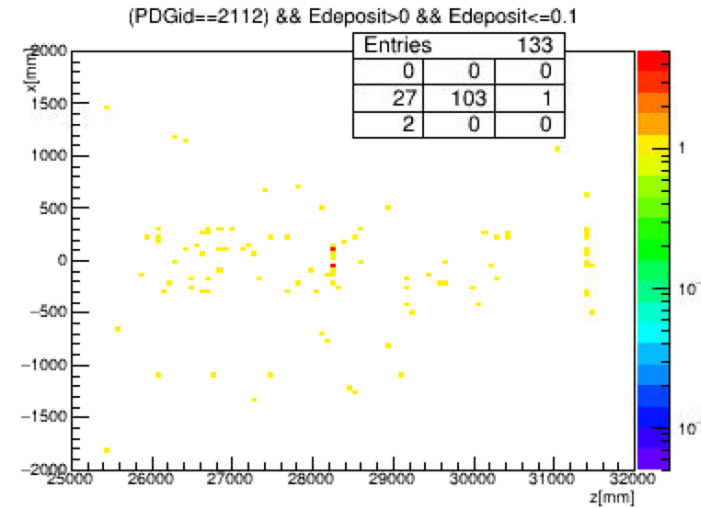
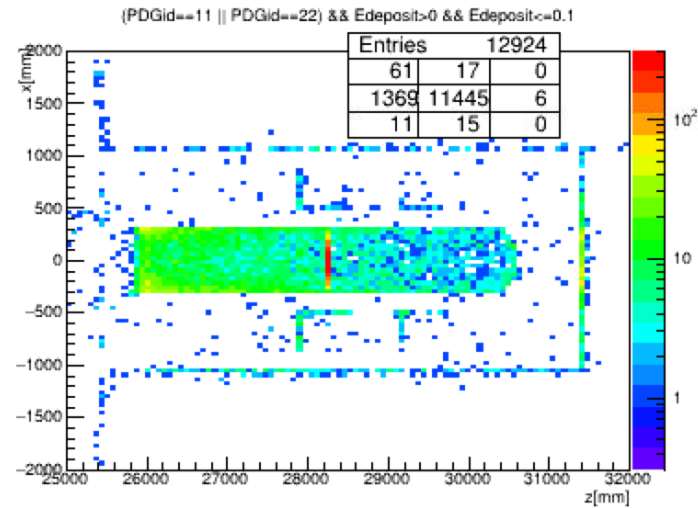
Hall Configuration



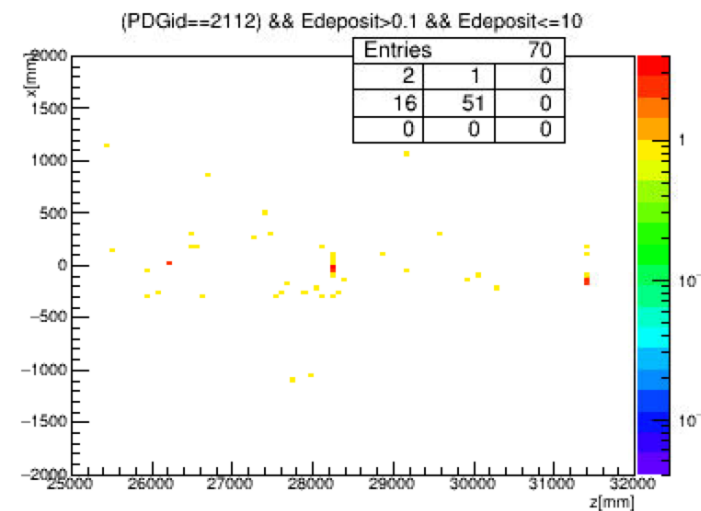
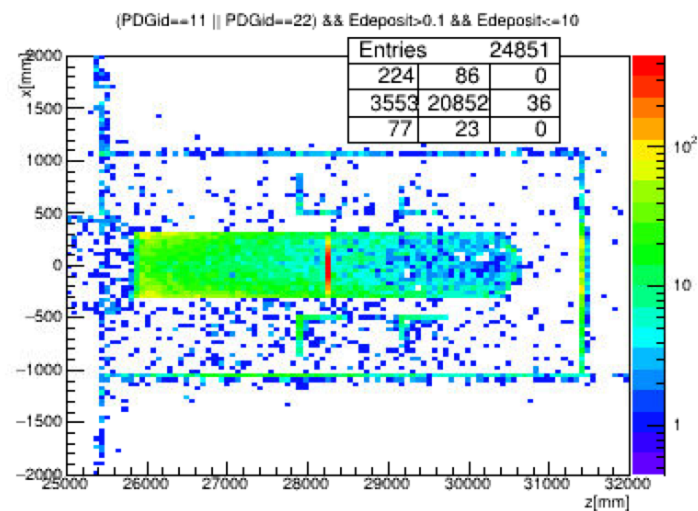
PREX2 - current dump

electrons+photons

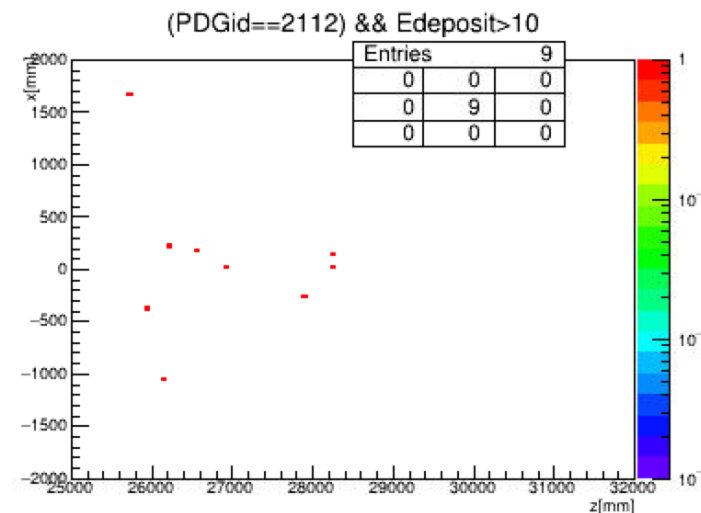
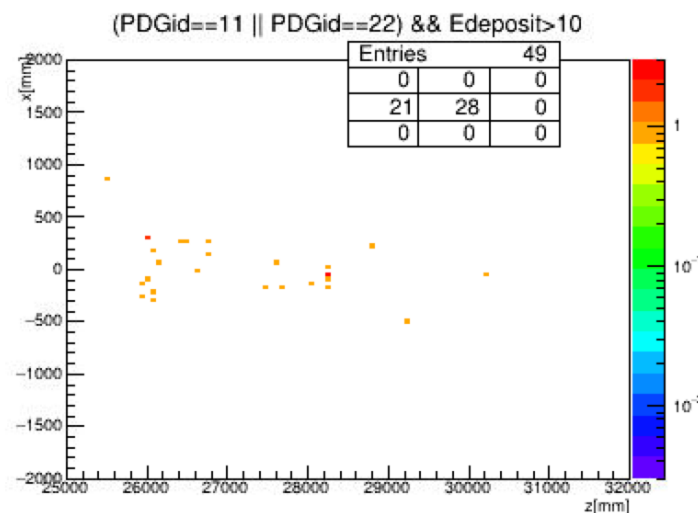
neutrons



$0 < E \leq 0.1$ MeV



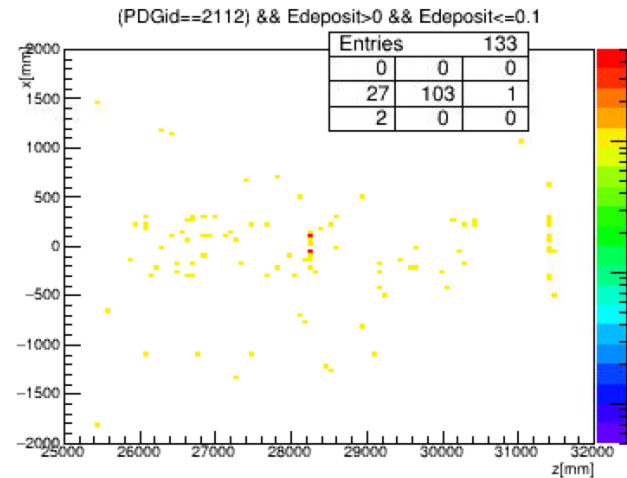
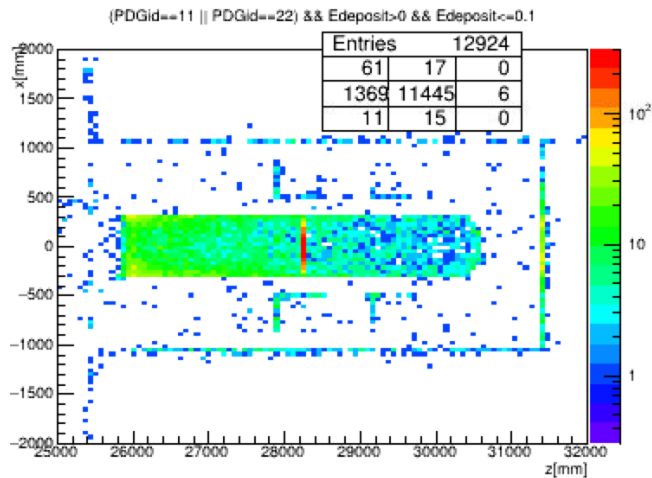
$0.1 < E \leq 10$ MeV



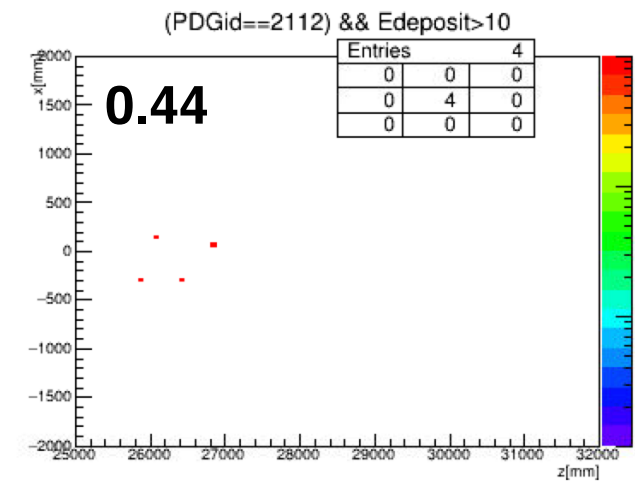
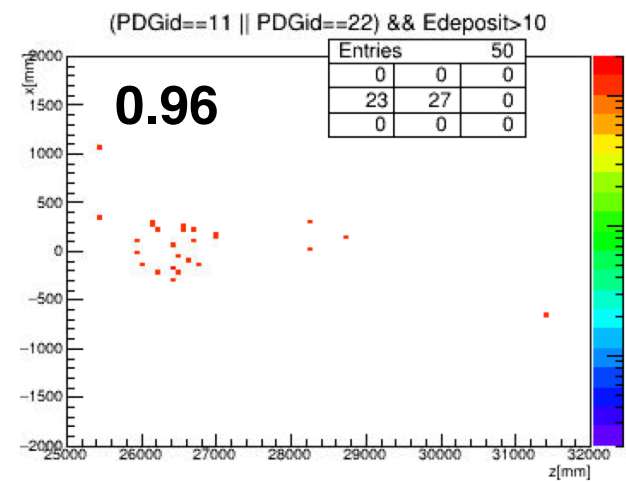
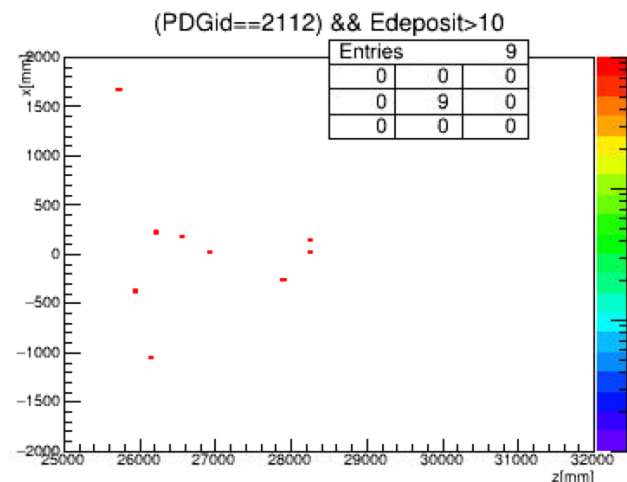
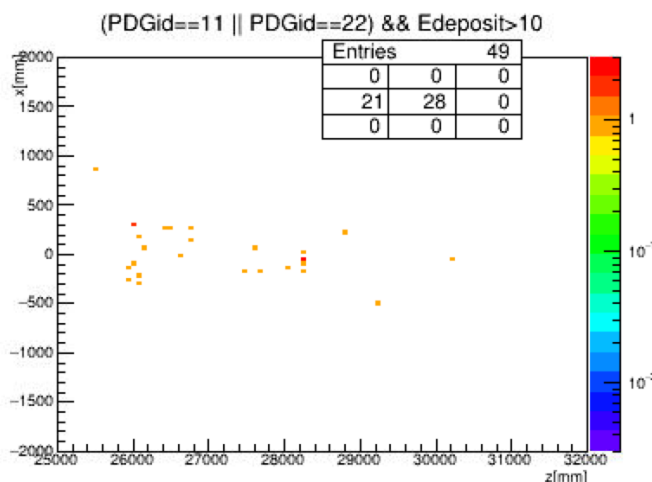
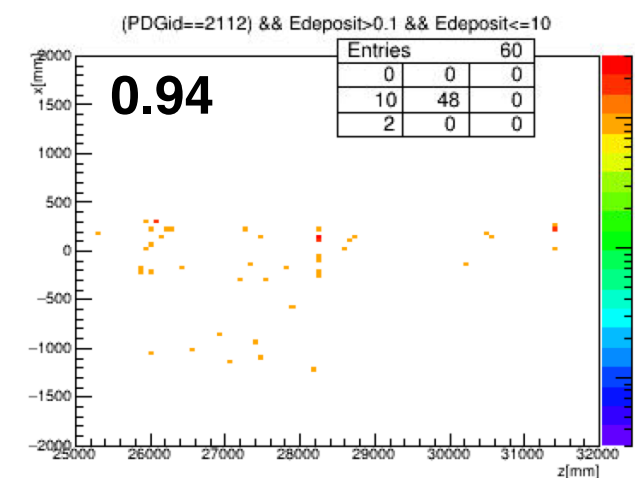
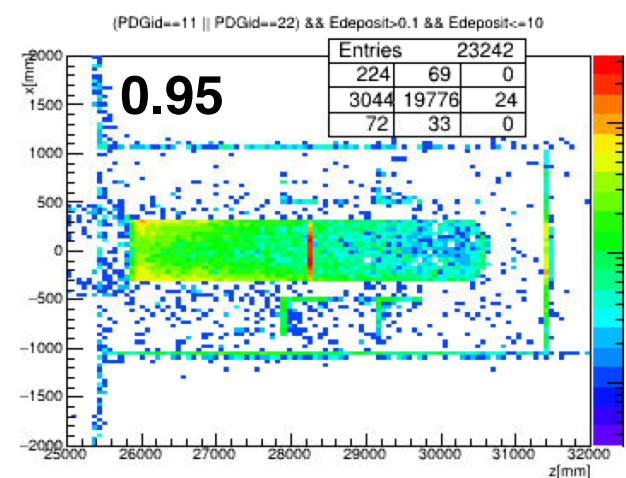
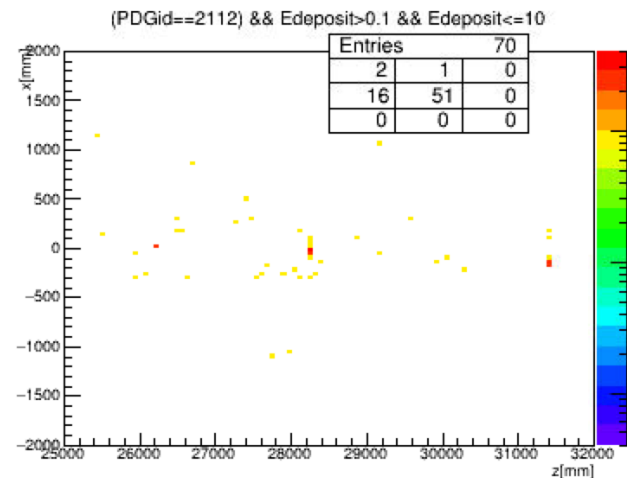
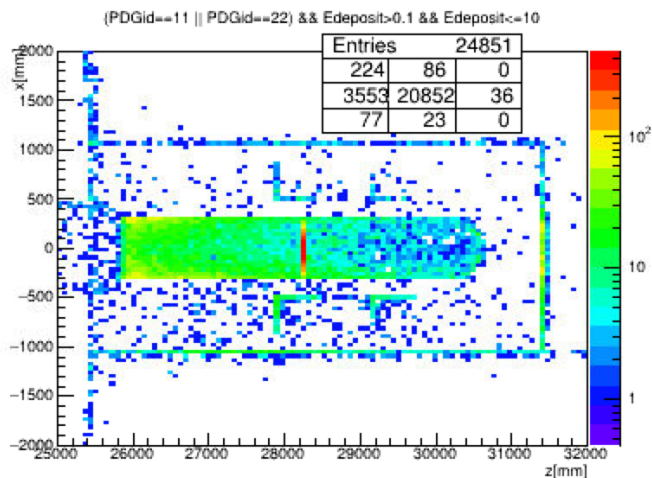
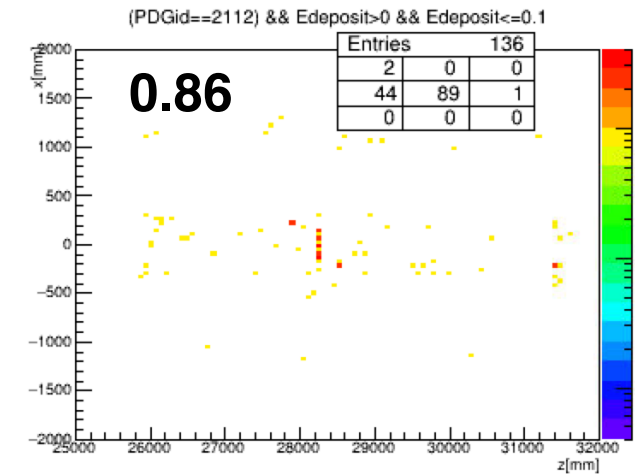
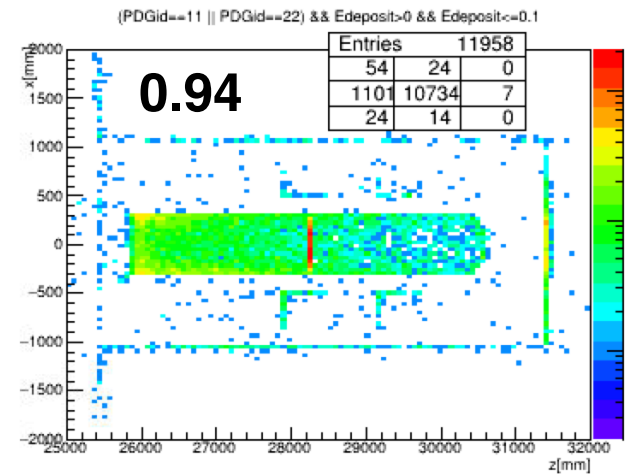
$10 < E$ MeV

PREX2 - comparison

current setup

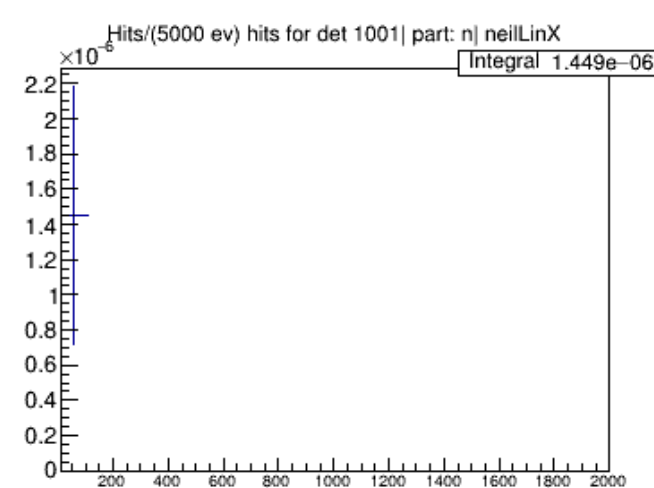
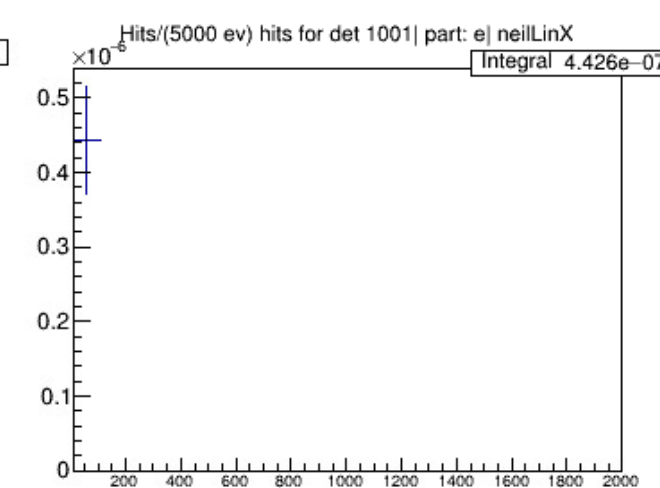
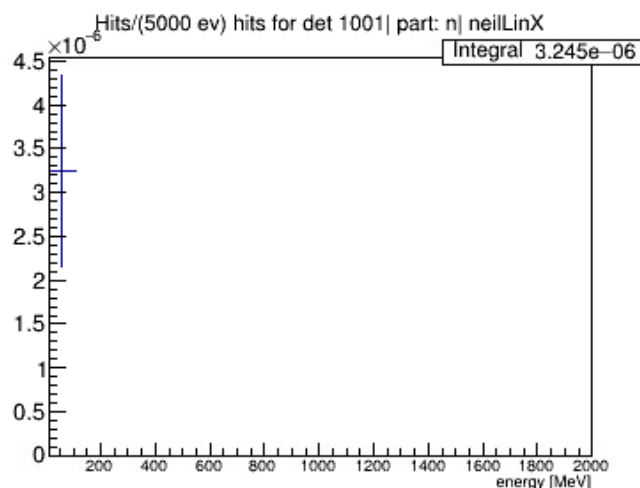
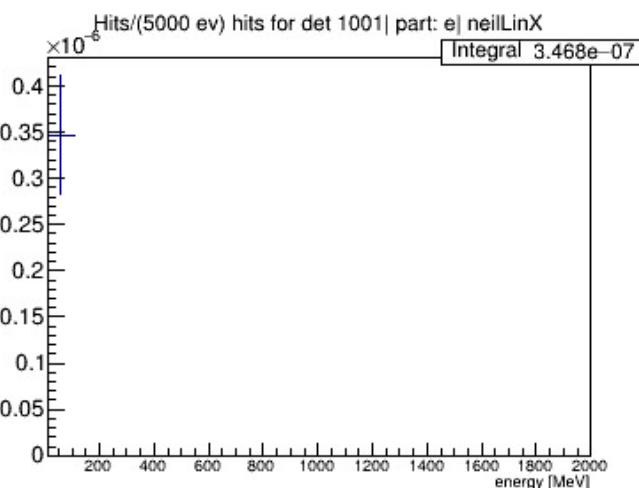
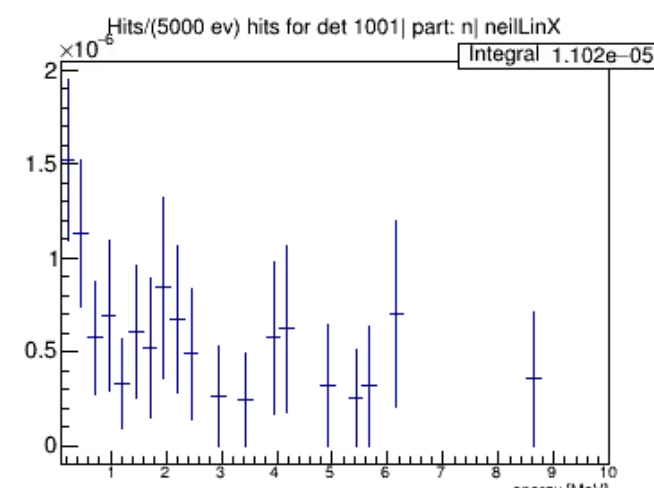
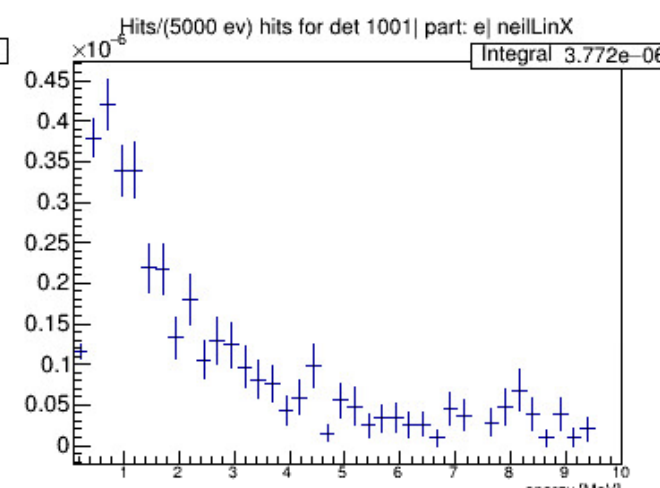
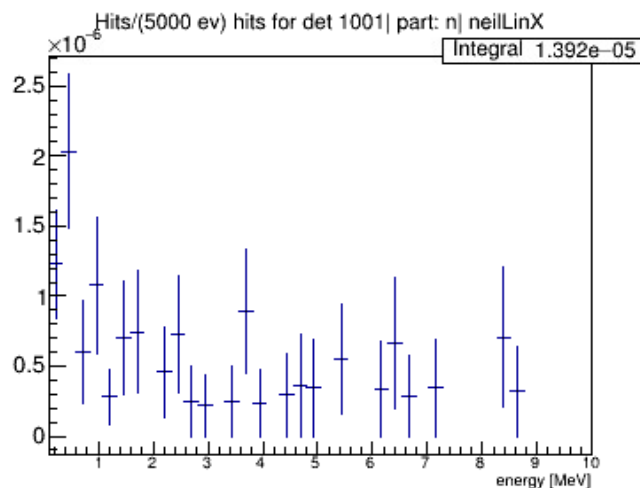
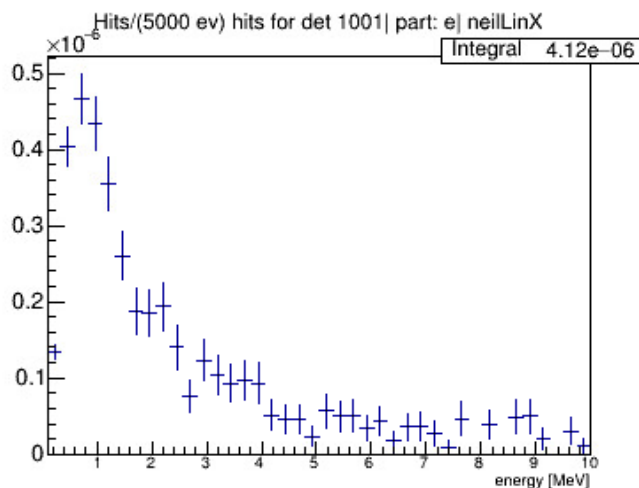
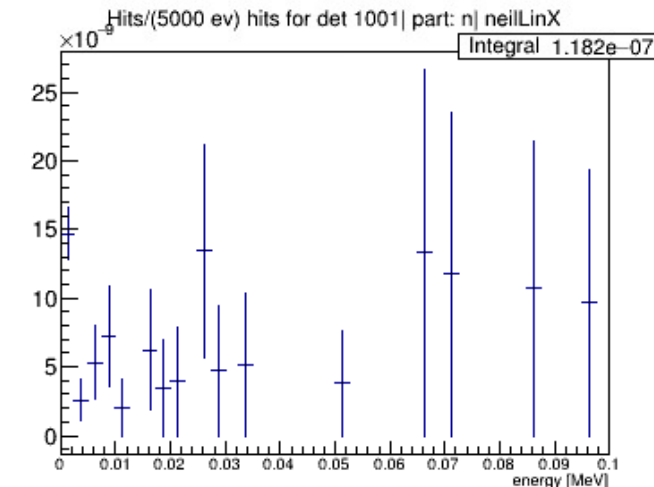
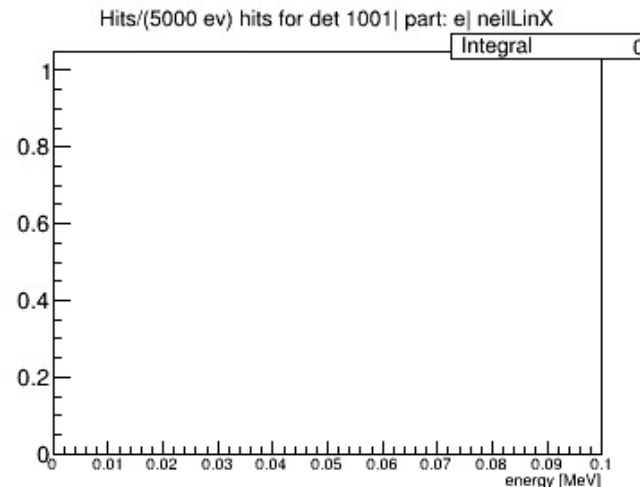
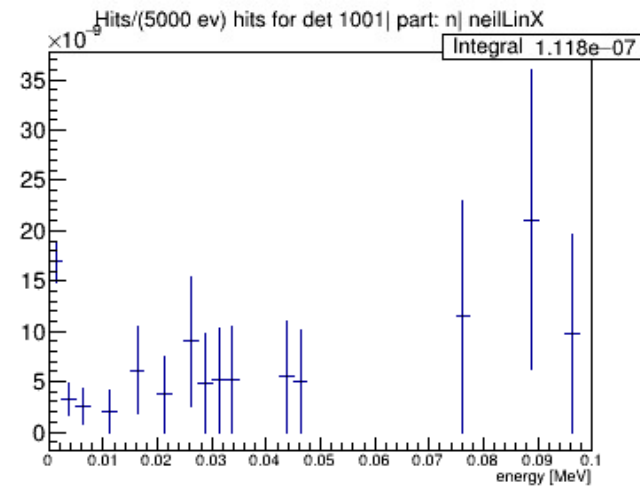
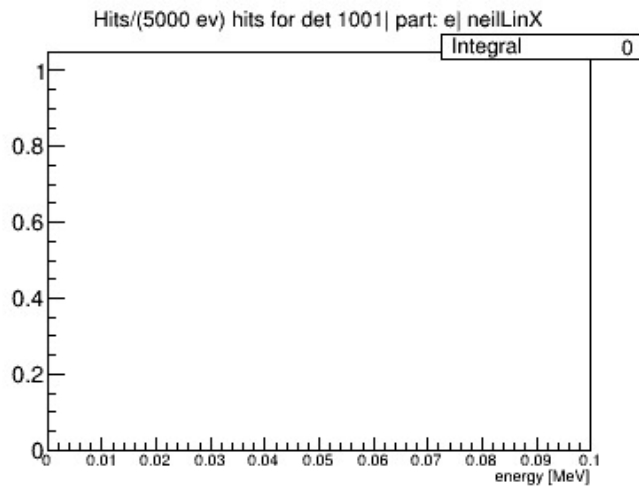


current setup + 4 in donut



PREX2 - comparison

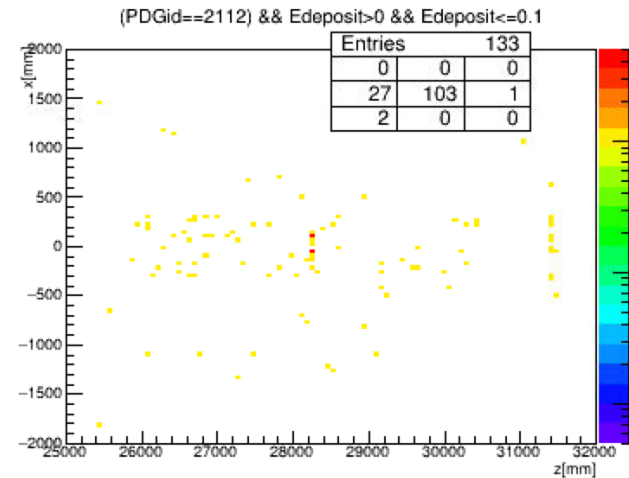
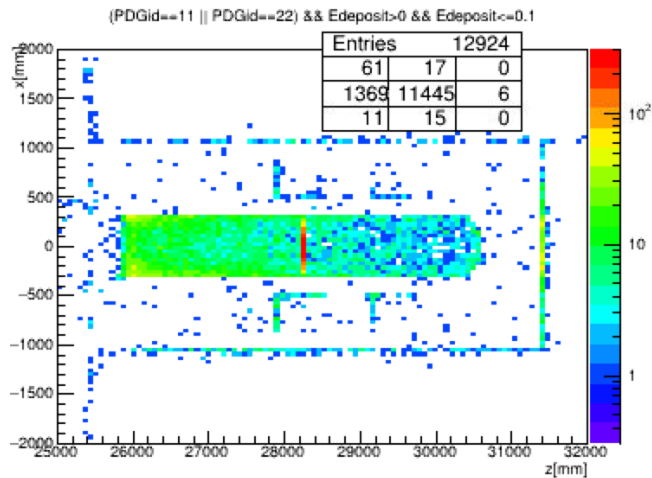
current setup



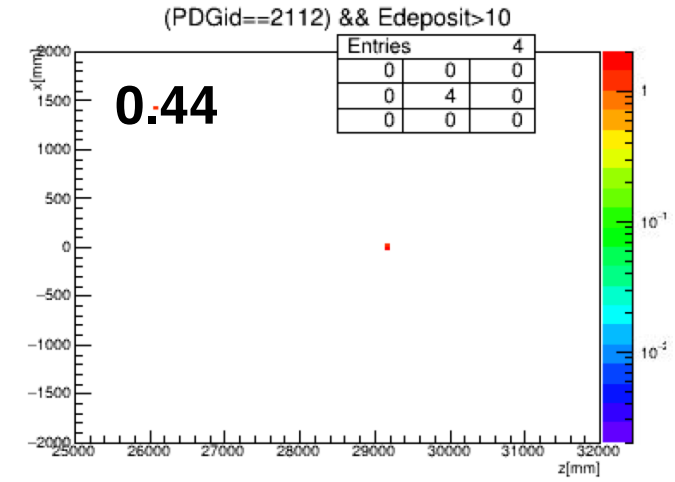
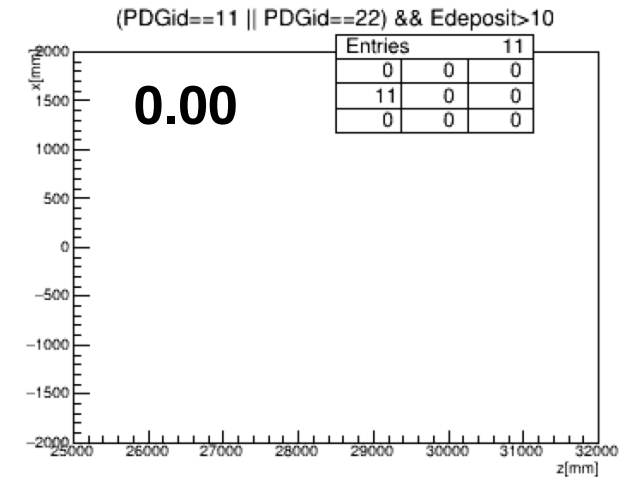
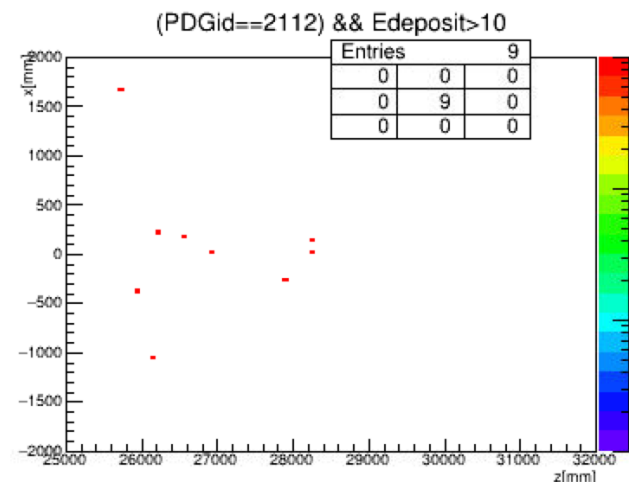
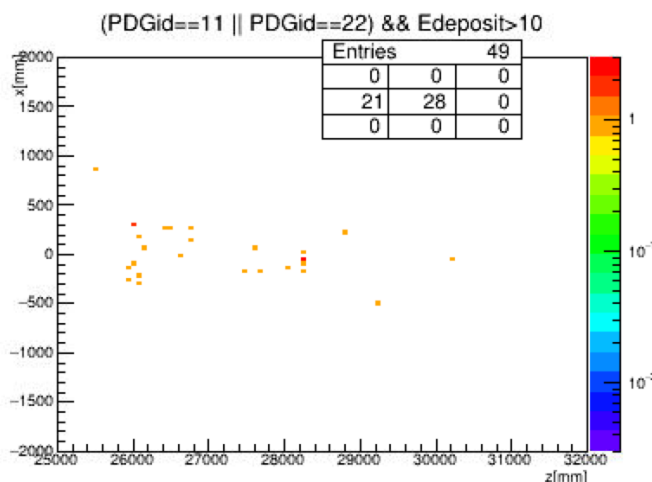
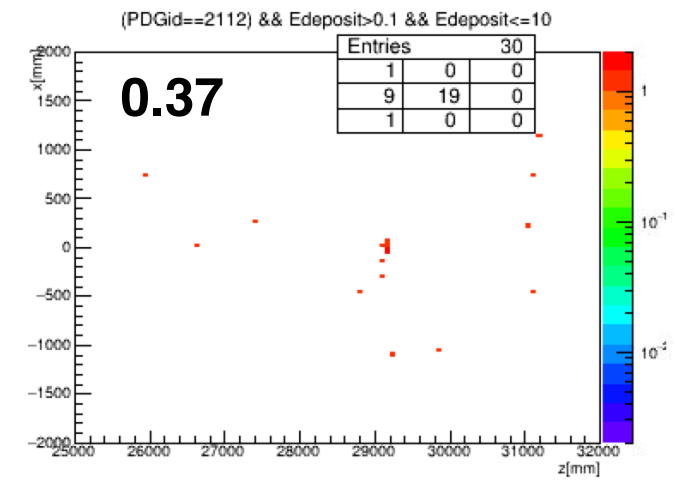
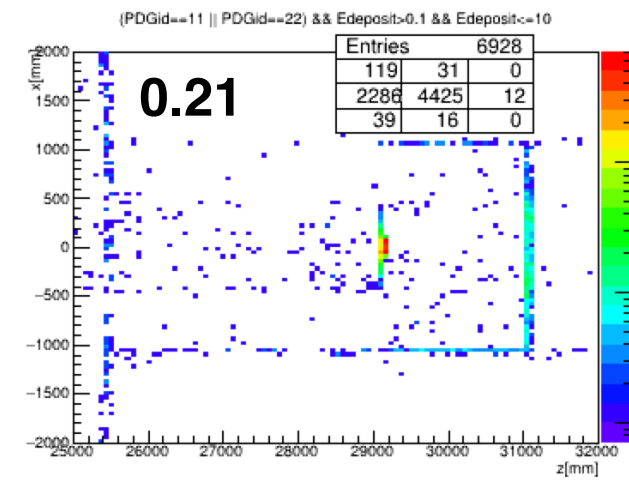
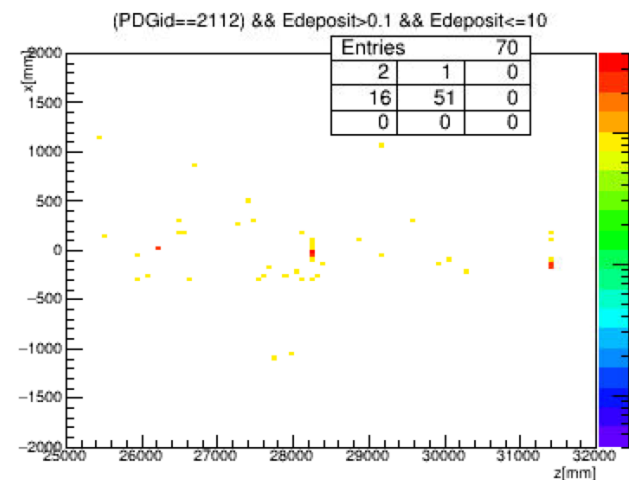
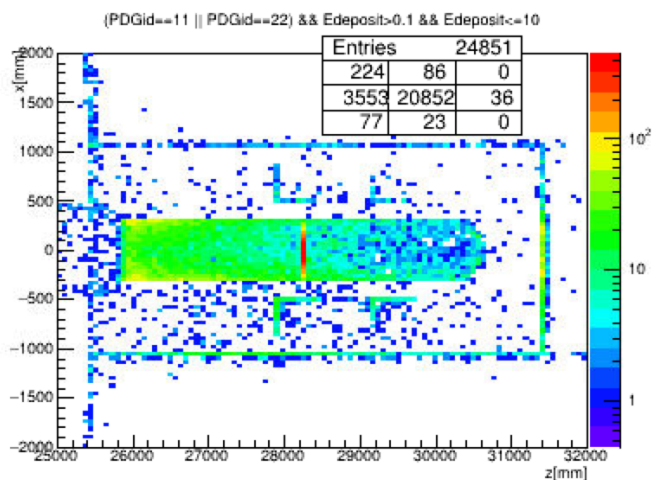
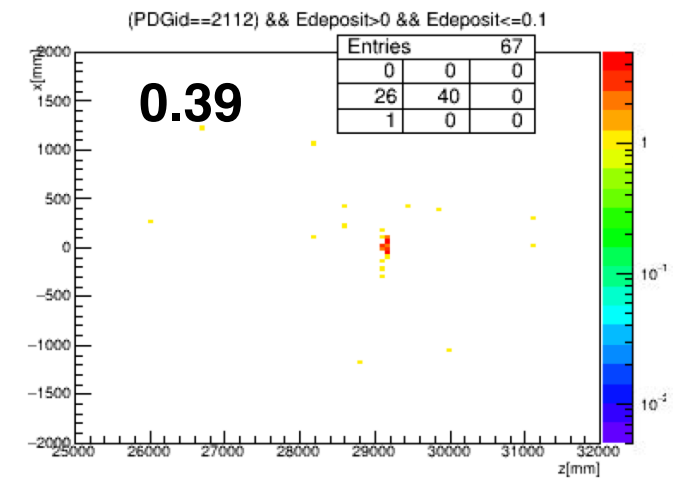
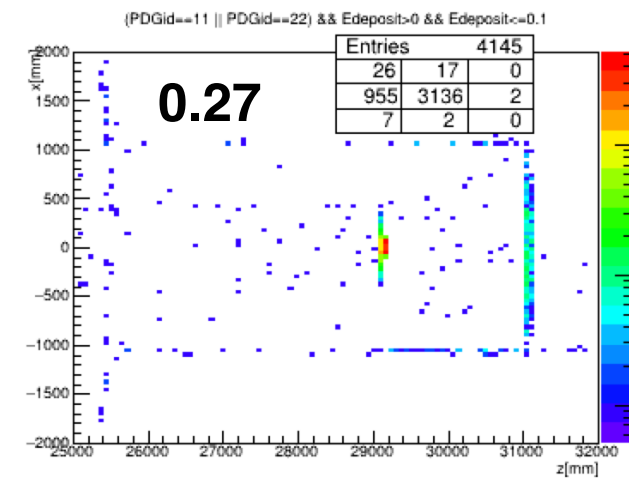
current setup + 4 in Donut

PREX2 - comparison

current setup

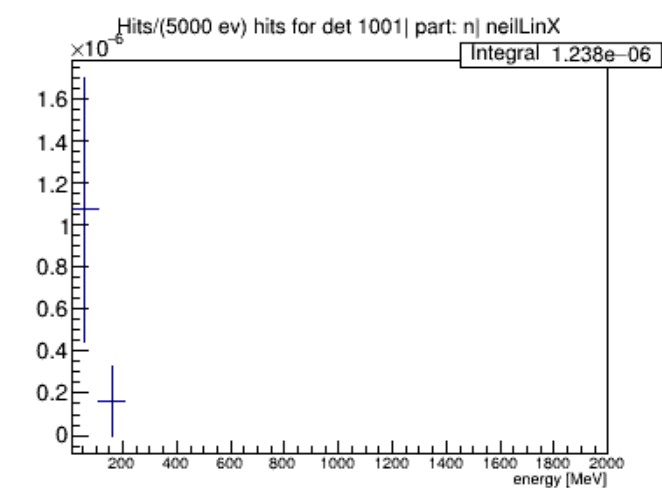
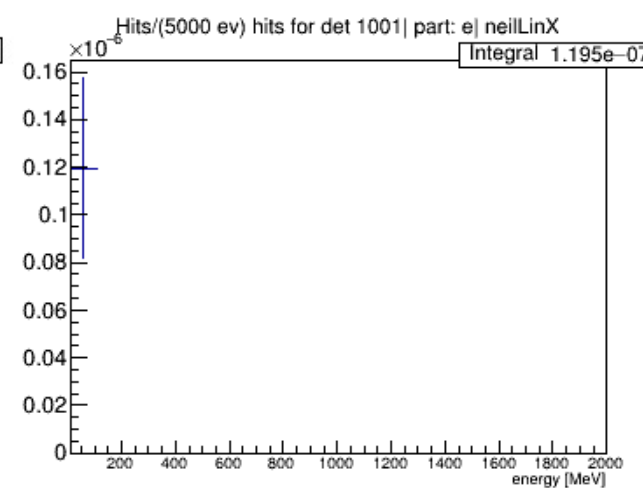
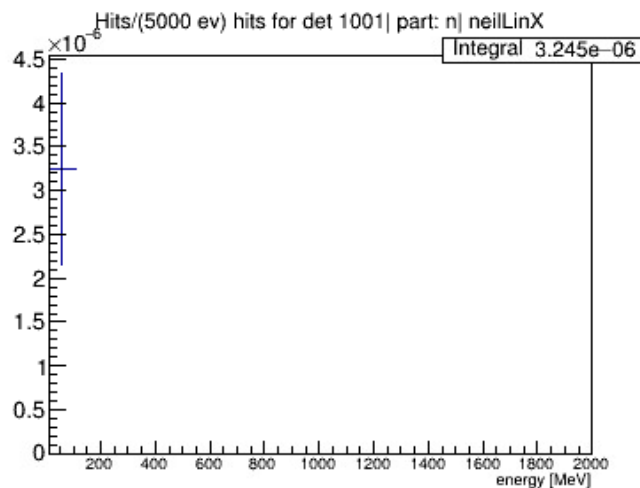
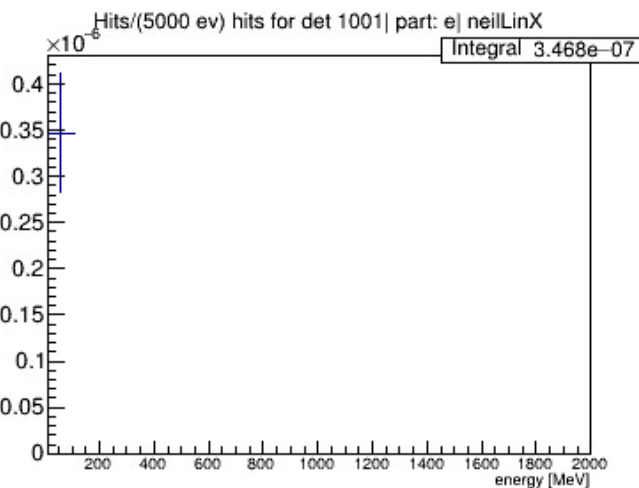
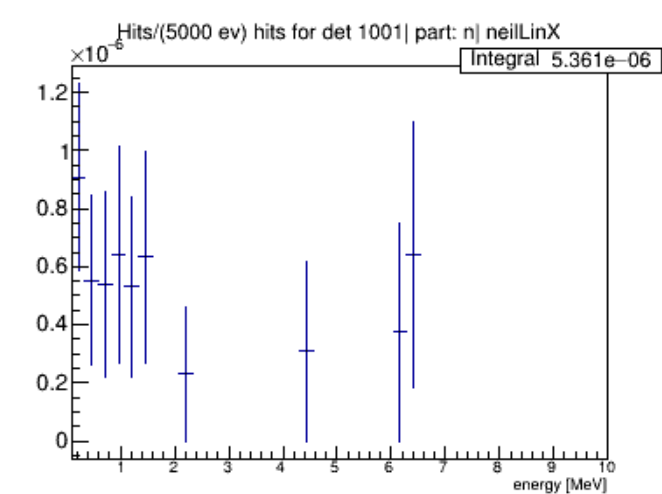
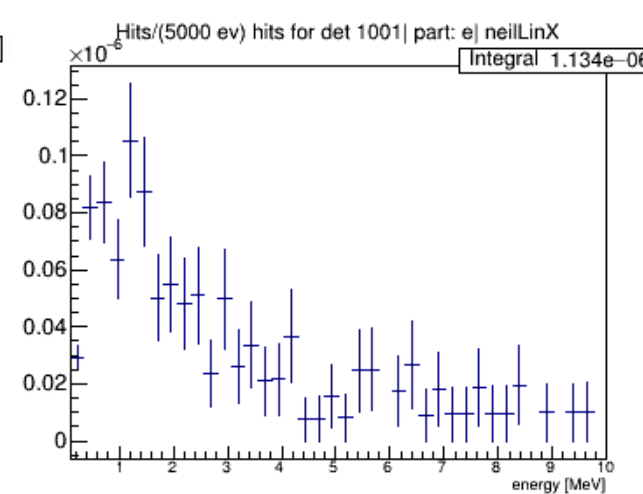
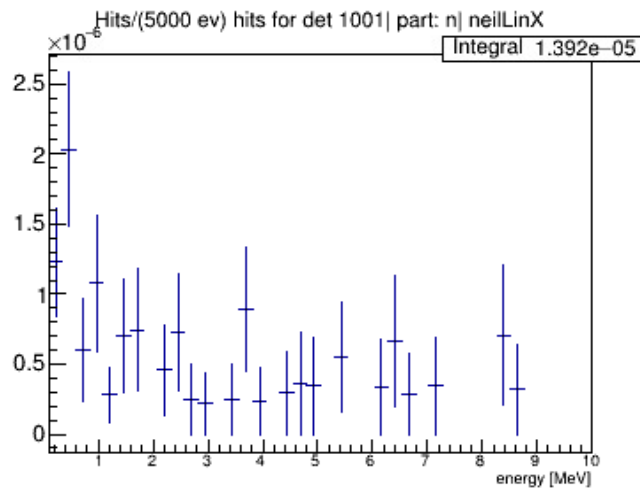
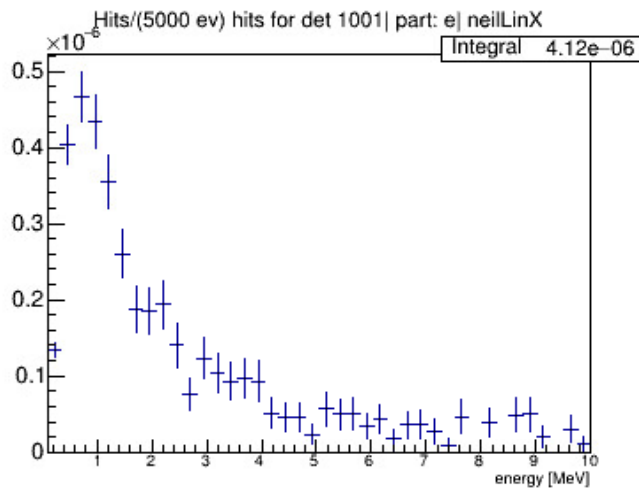
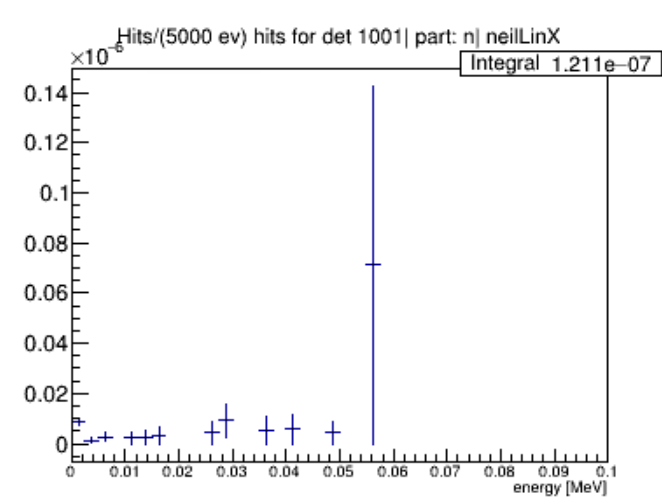
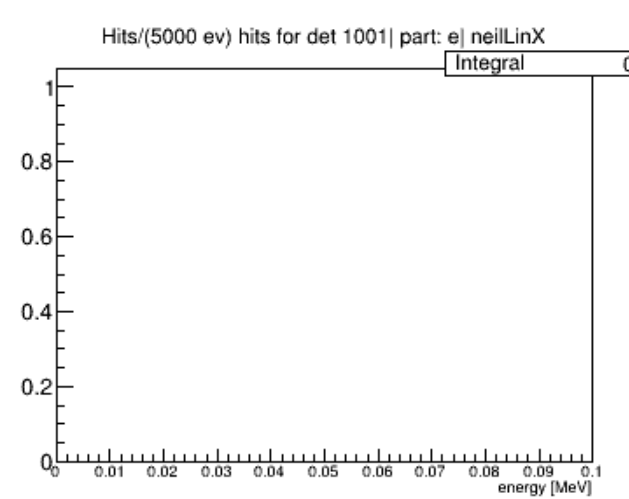
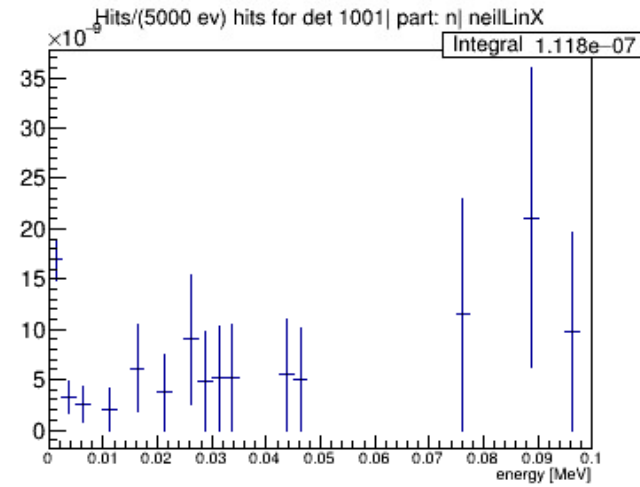
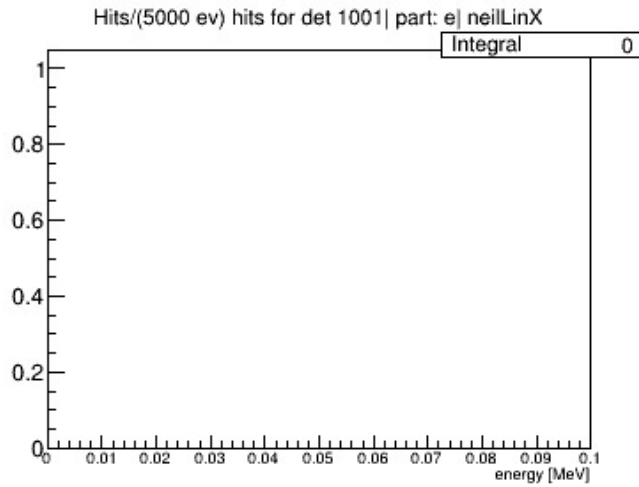


PREX1 dump configuration



PREX2 - comparison

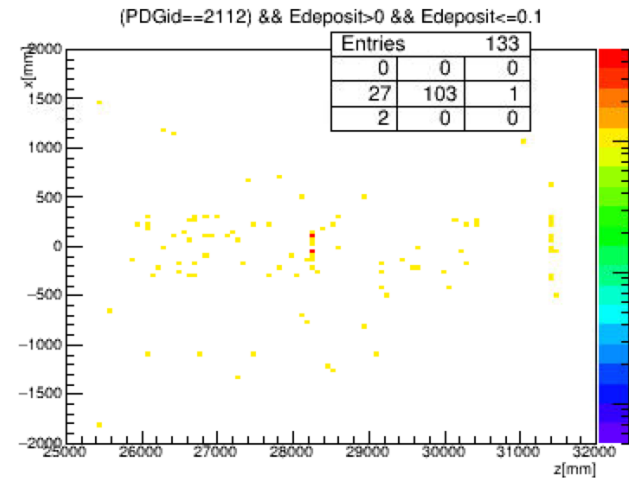
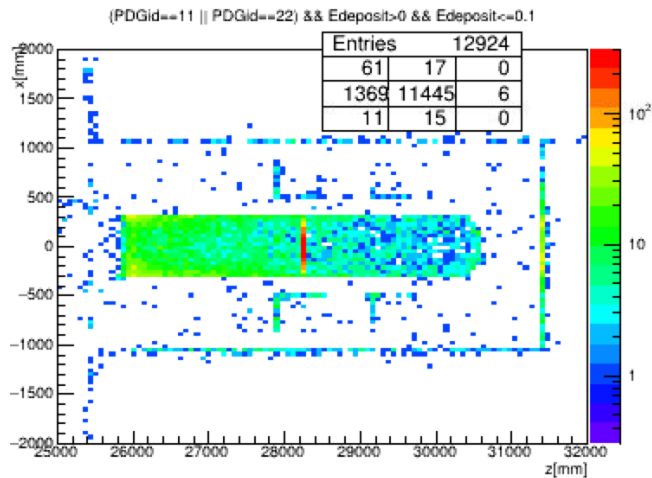
current setup



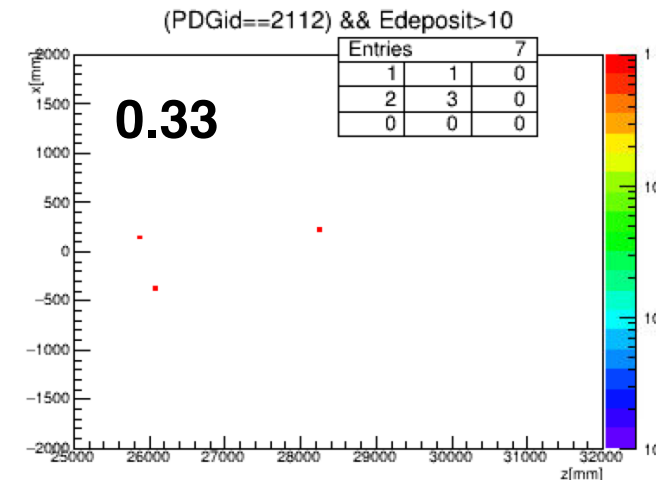
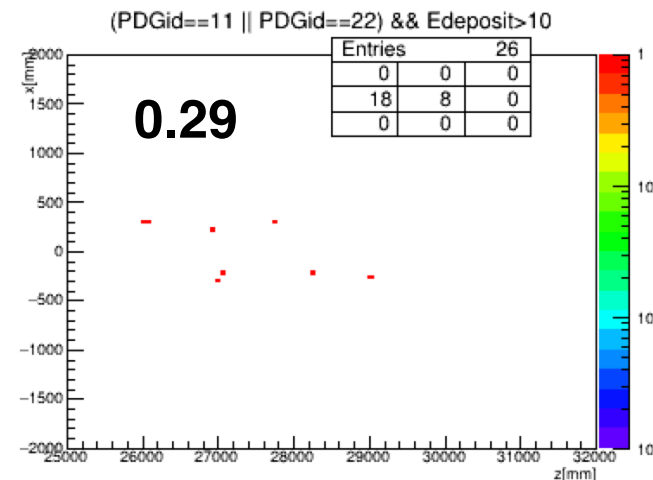
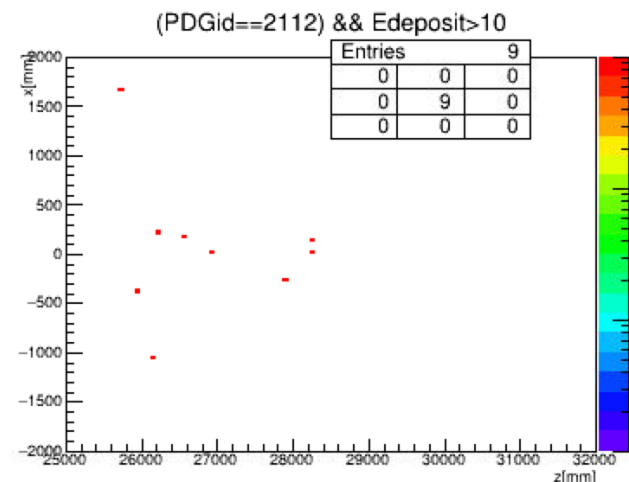
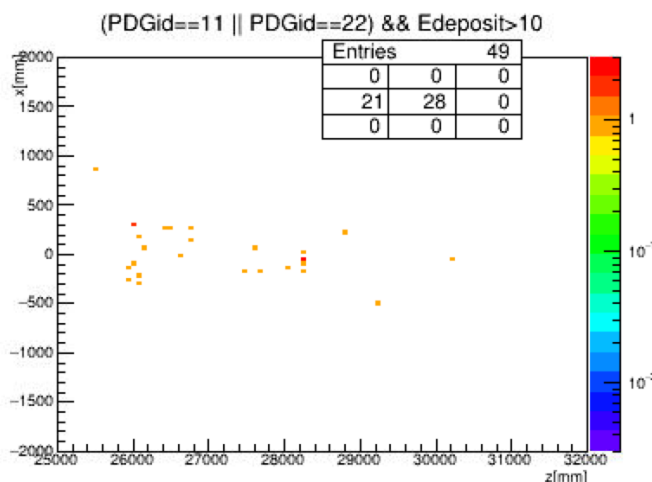
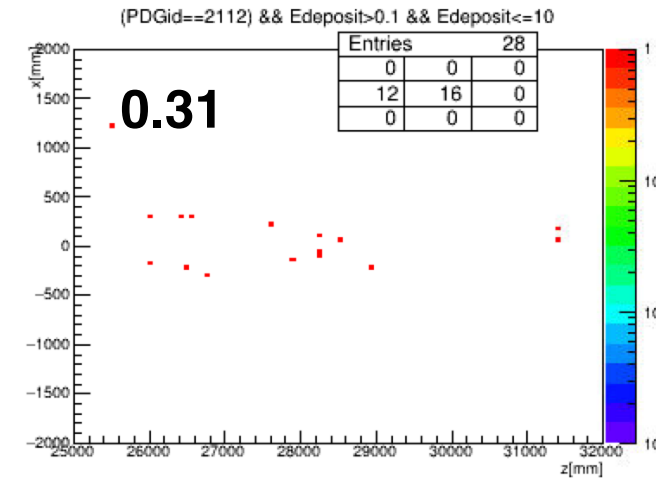
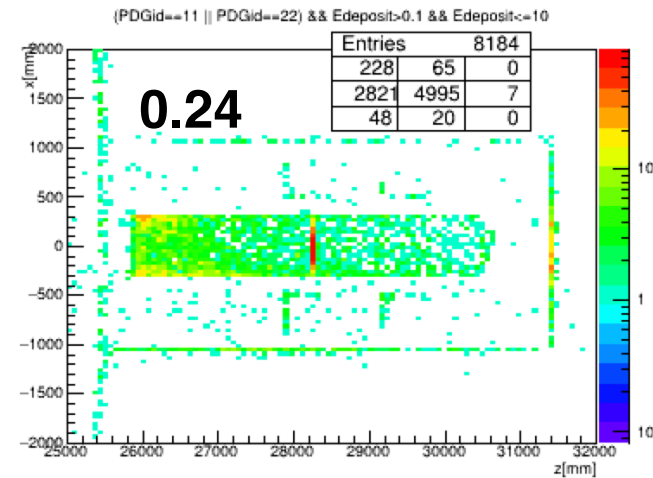
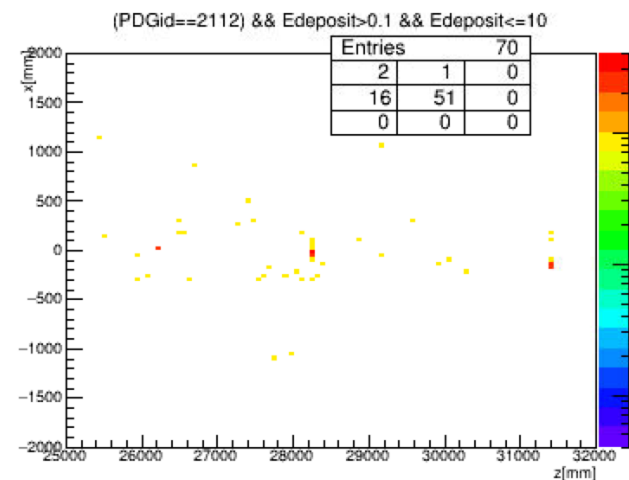
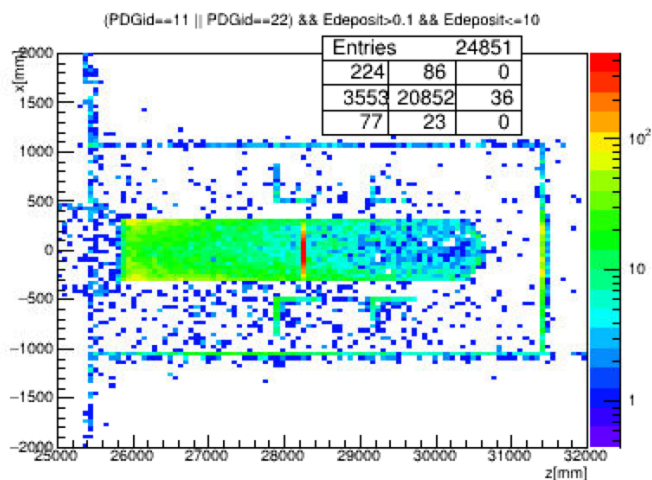
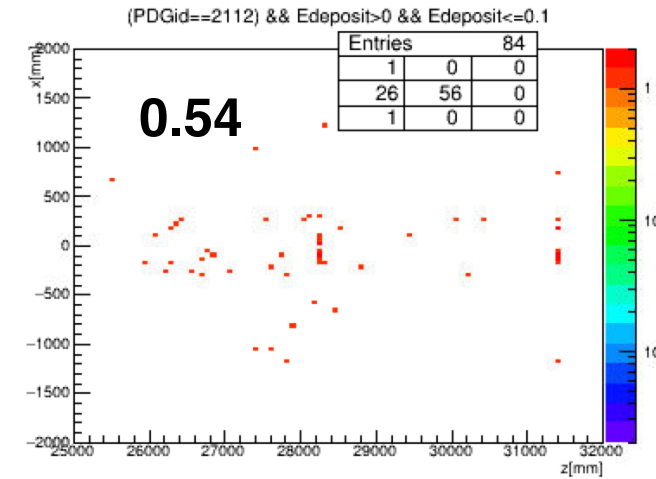
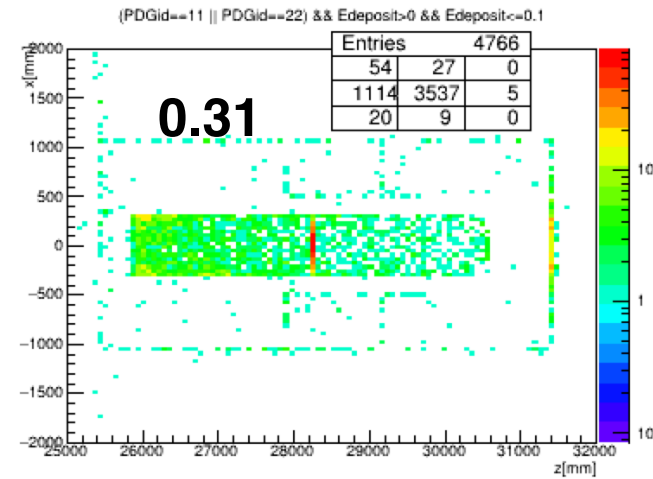
PREX1 dump configuration

PREX2 - comparison

current setup

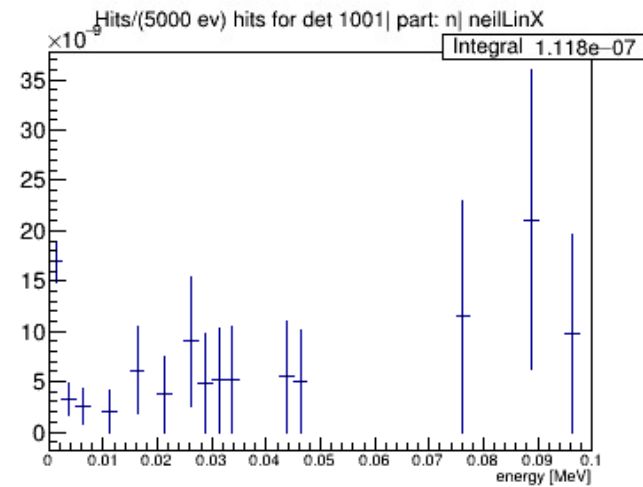
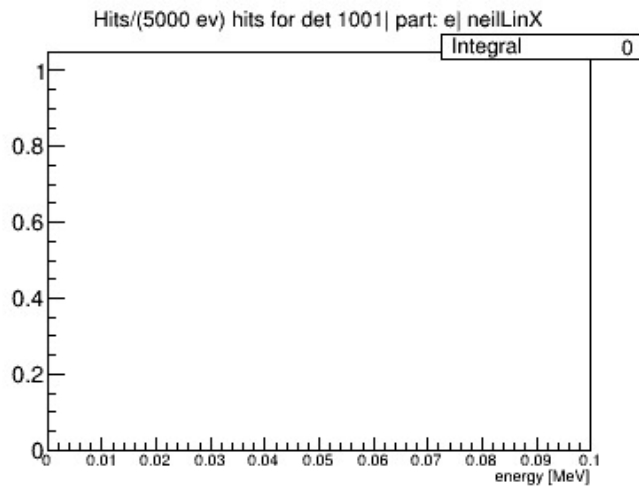


current setup + 1 ft concrete shield

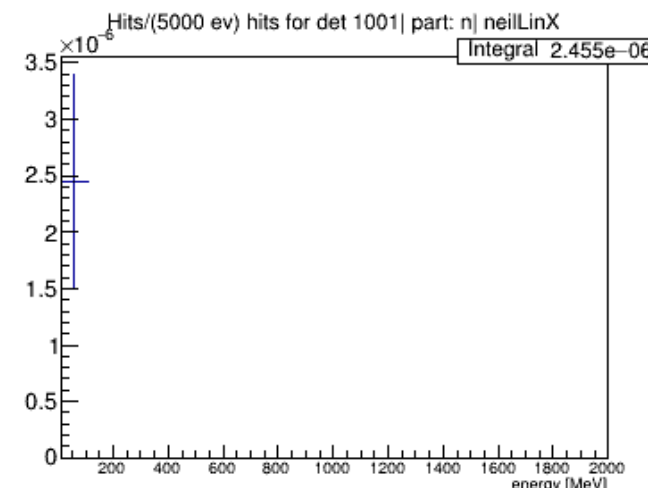
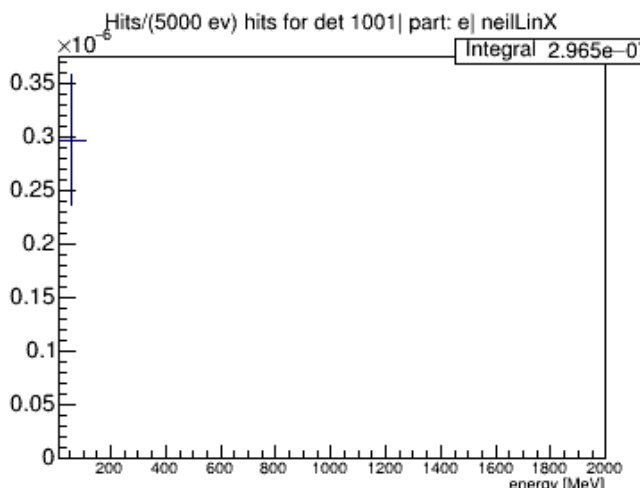
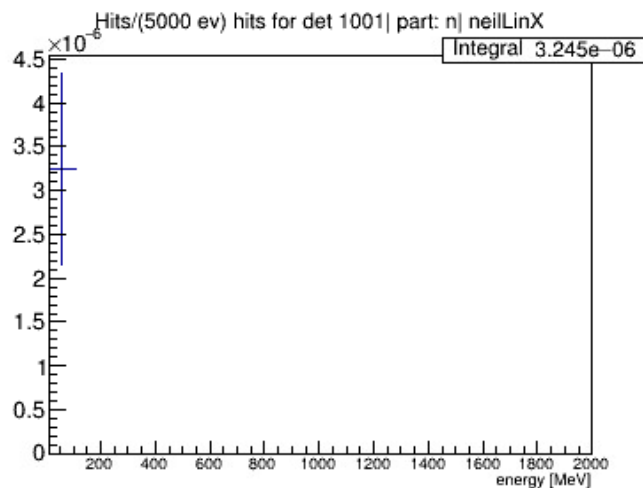
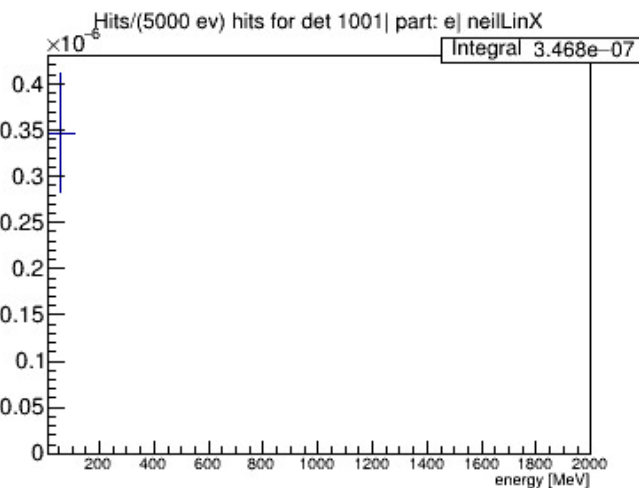
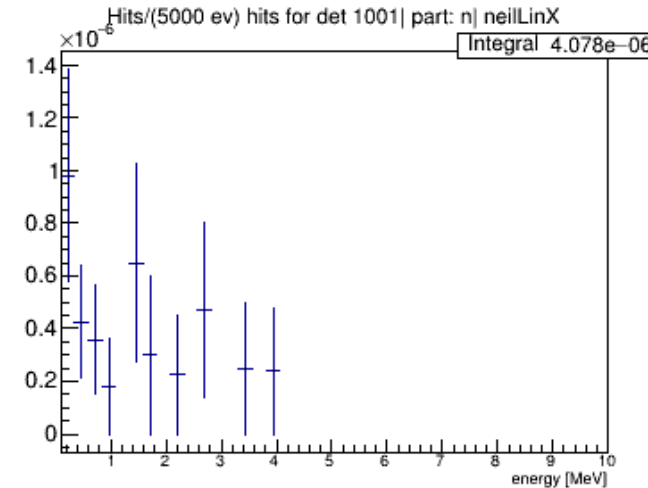
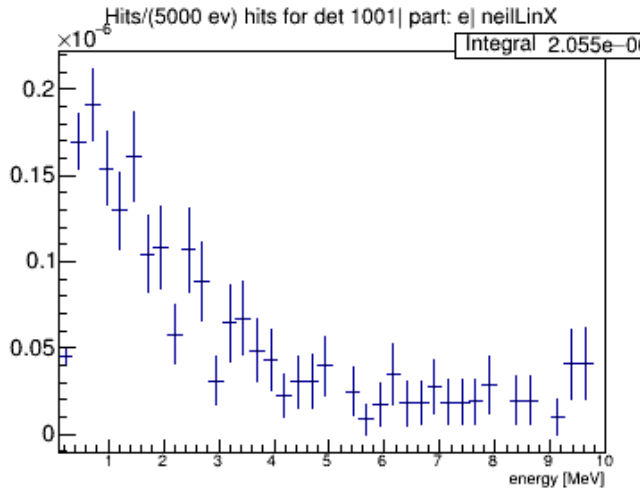
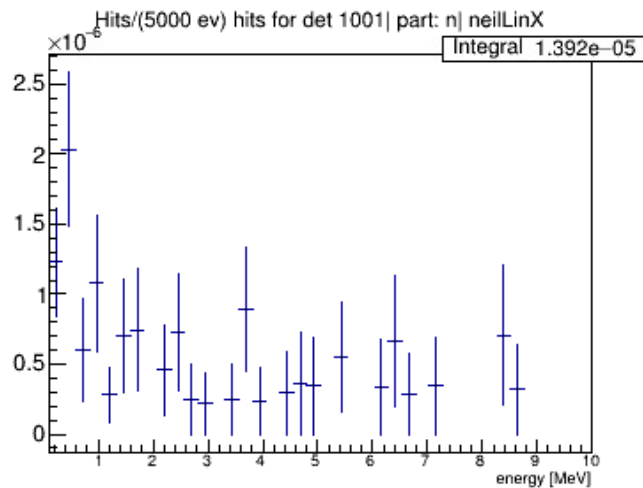
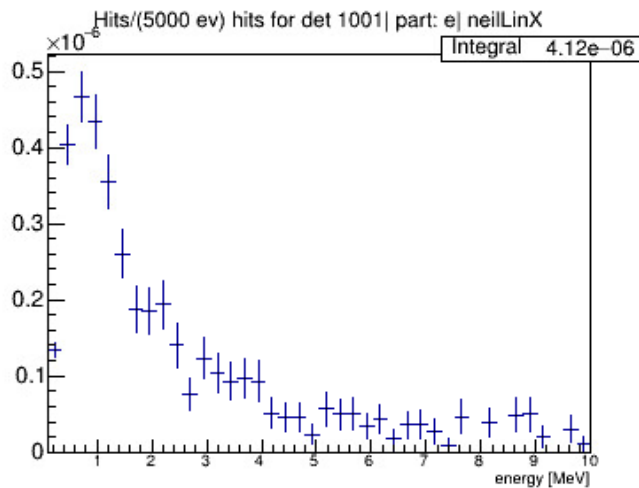
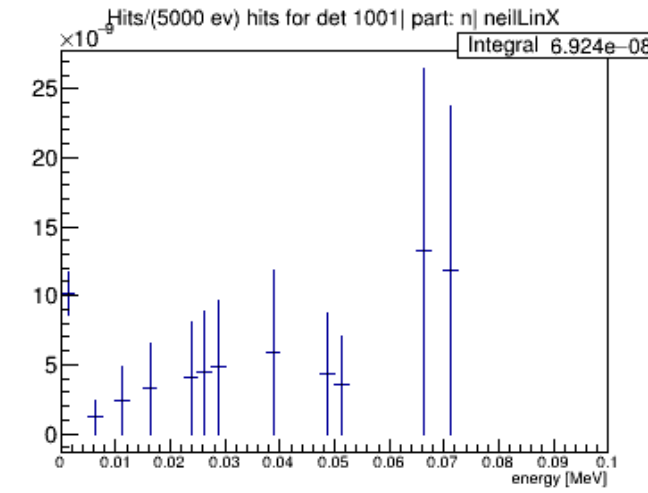
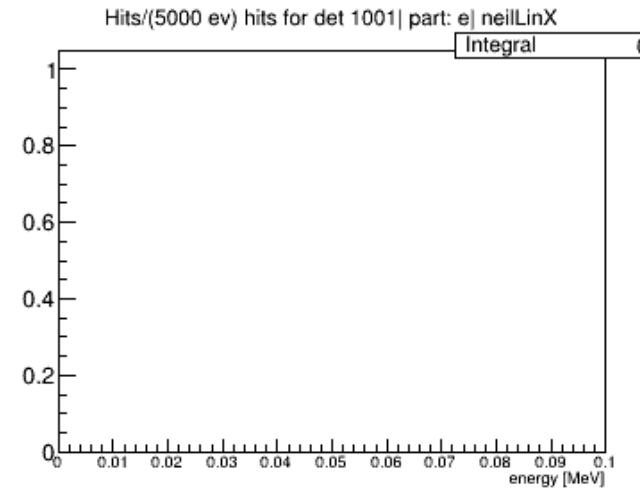


PREX2 - comparison

current setup

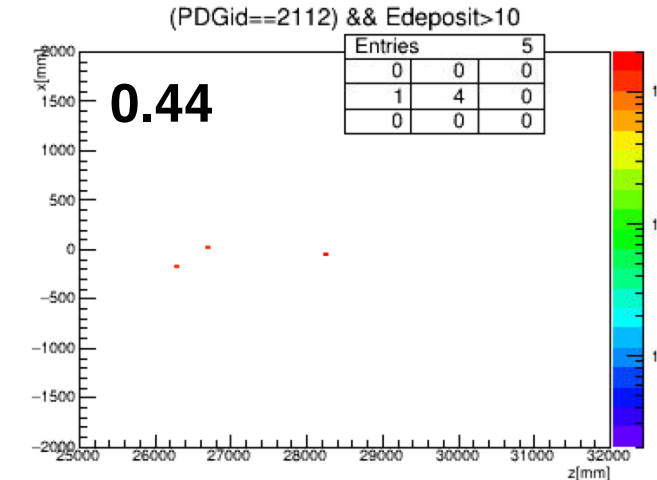
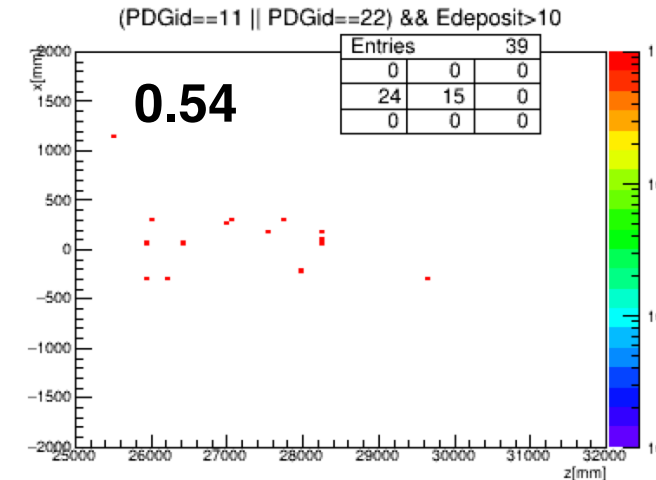
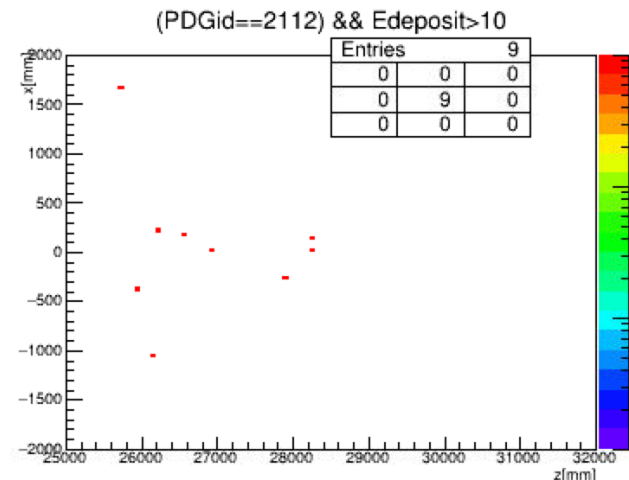
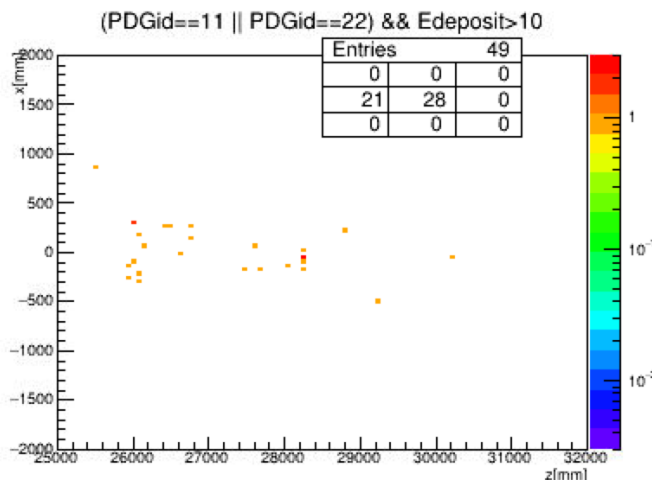
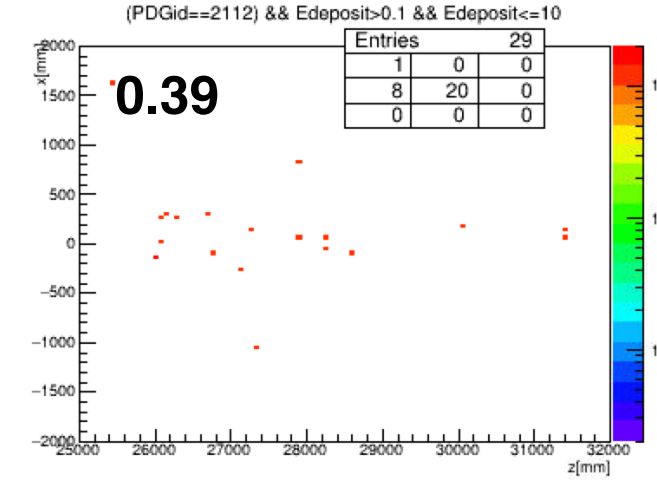
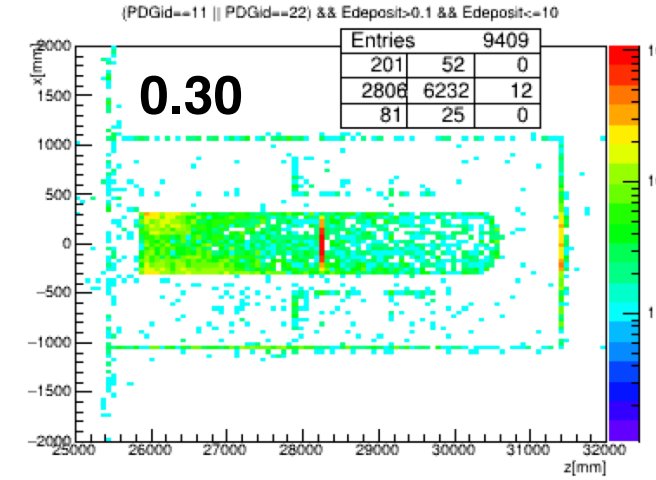
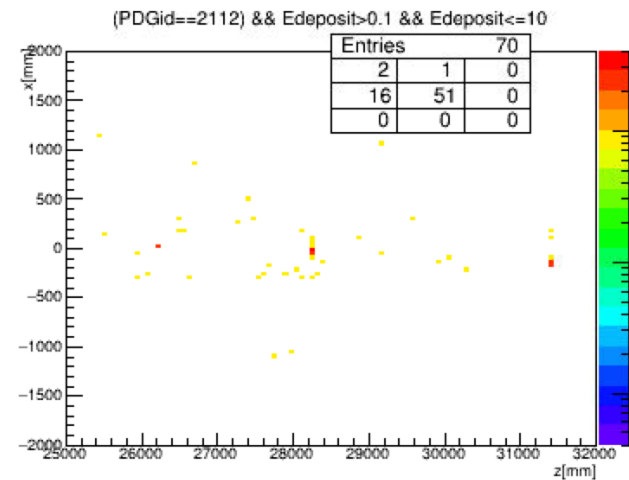
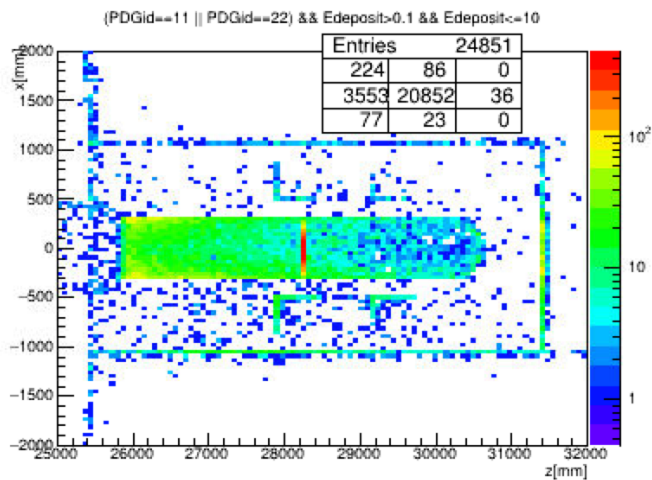
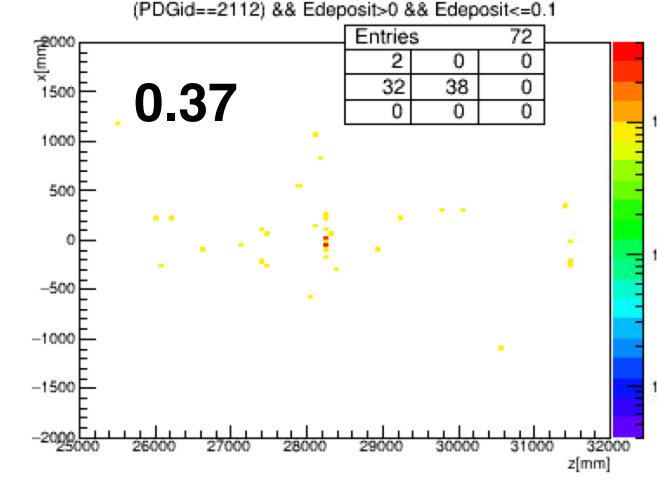
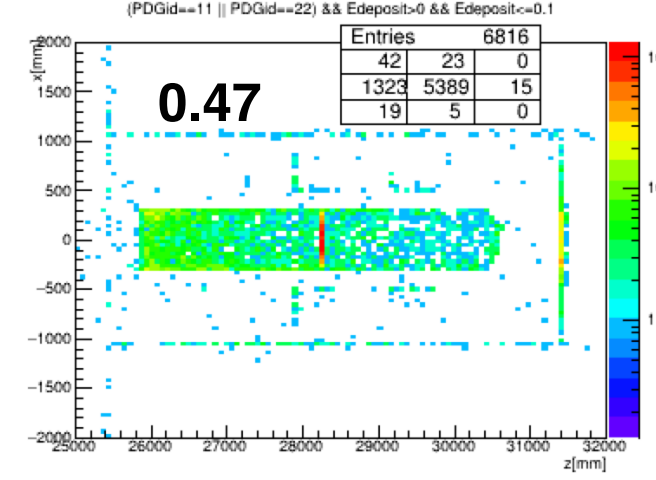
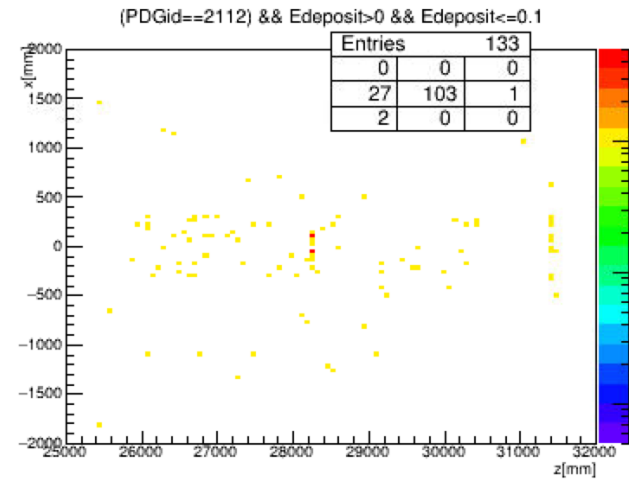
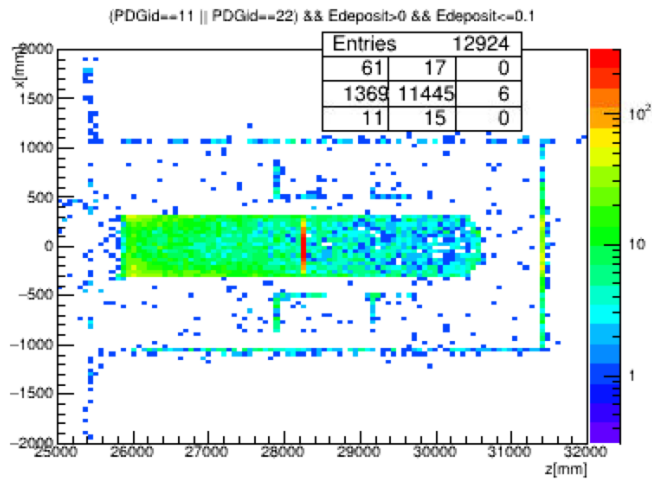


current setup + 1 ft concrete shield



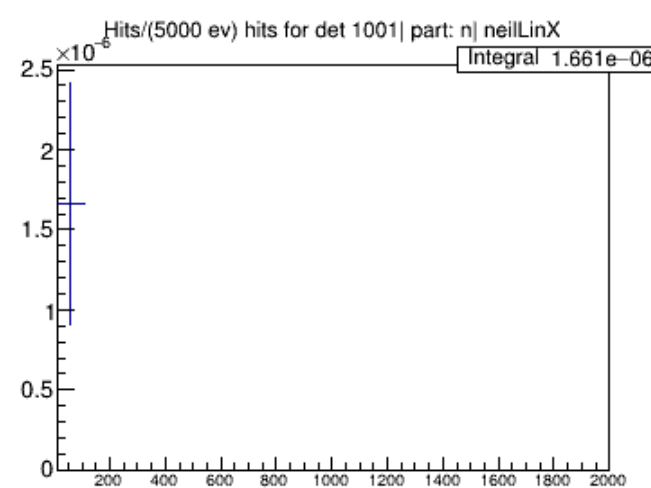
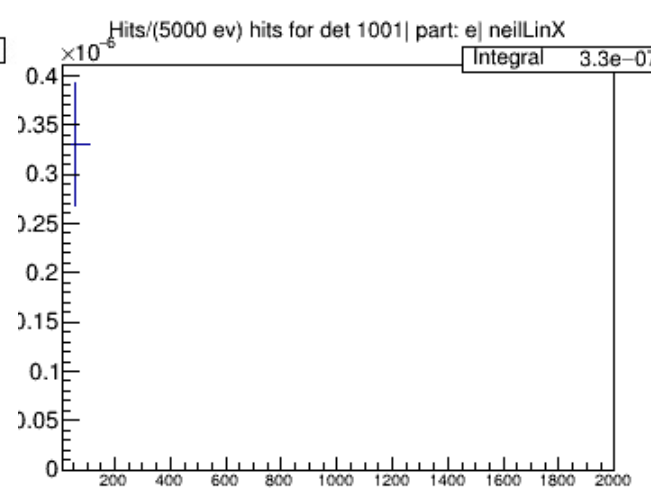
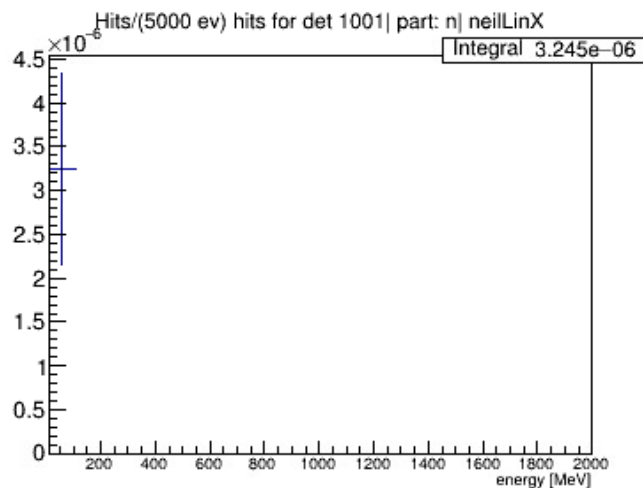
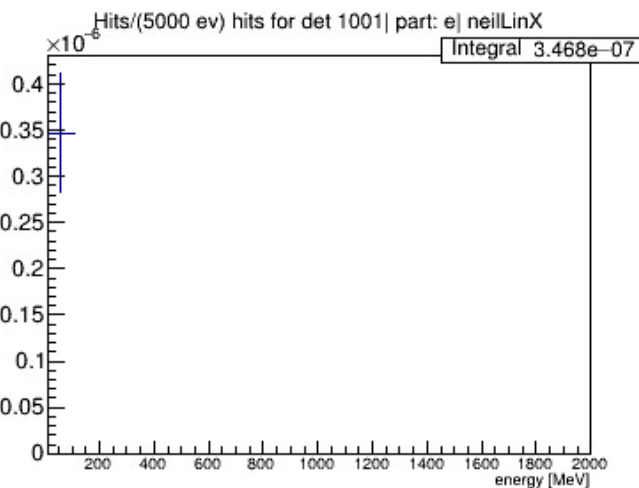
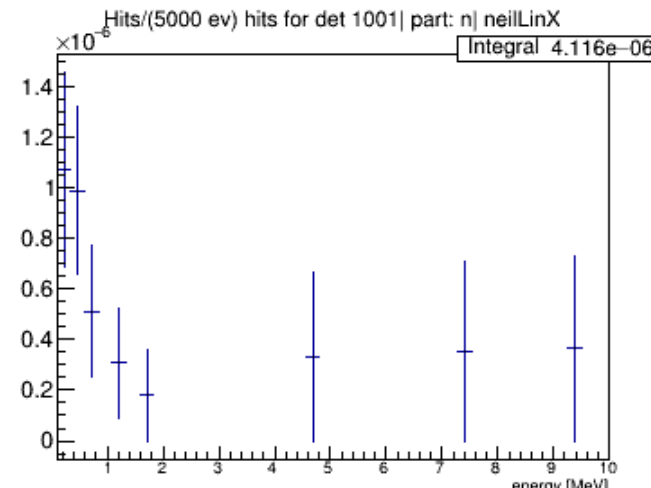
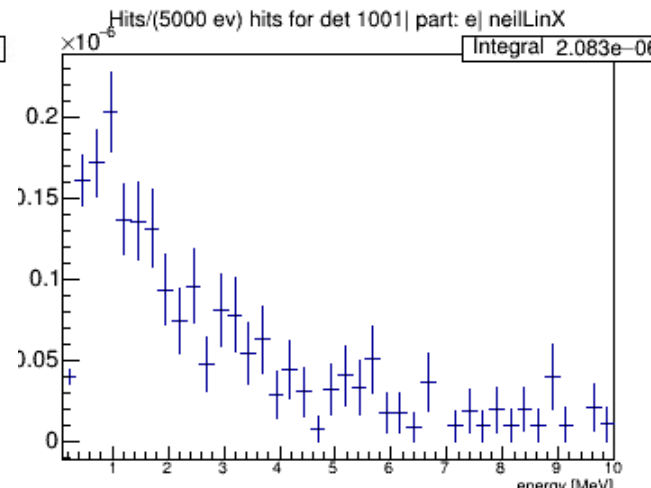
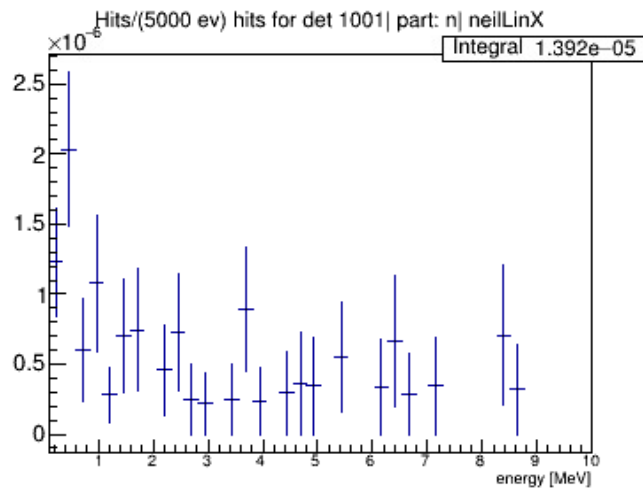
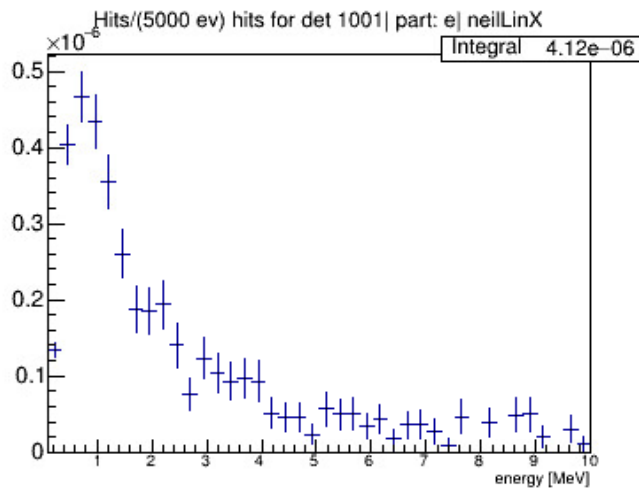
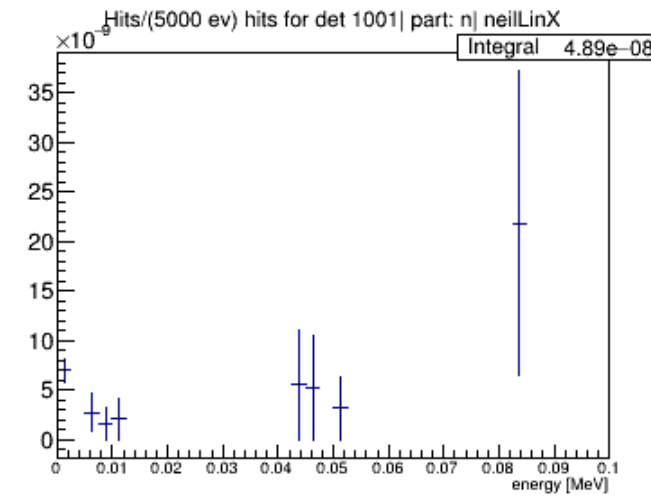
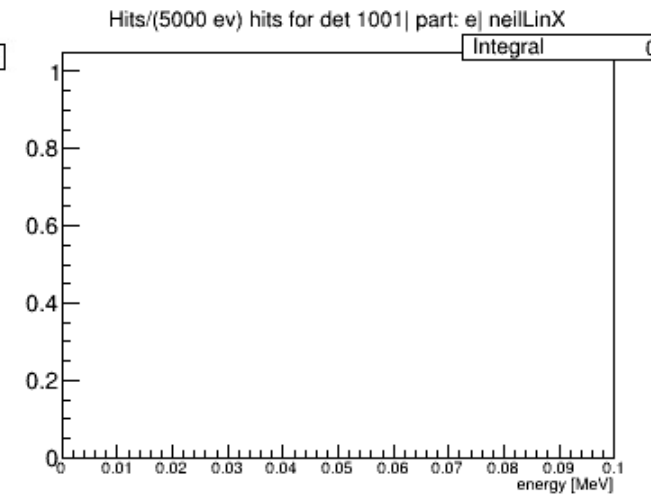
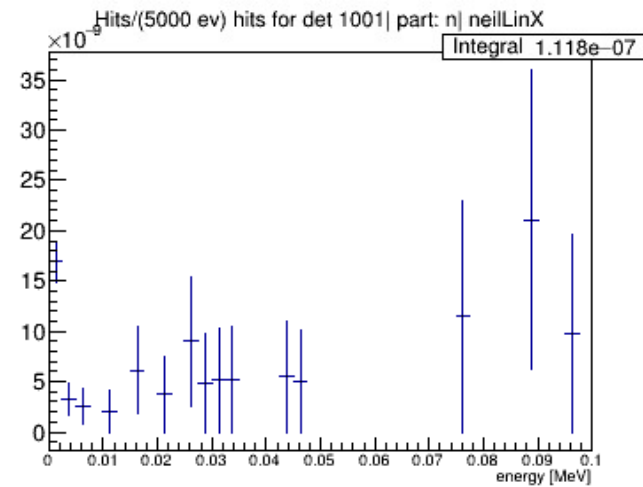
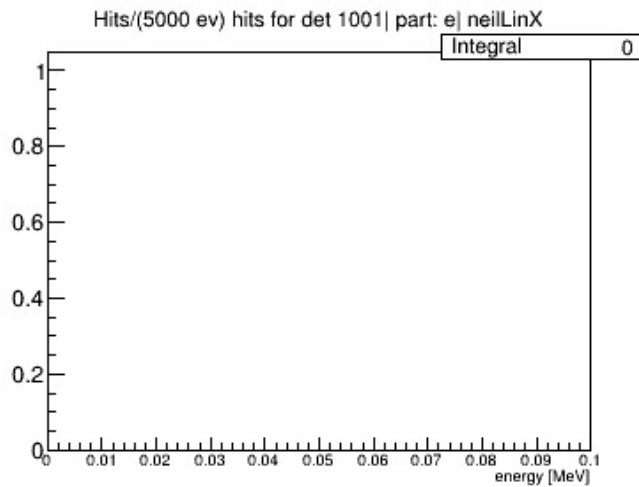
PREX2 - comparison

current setup



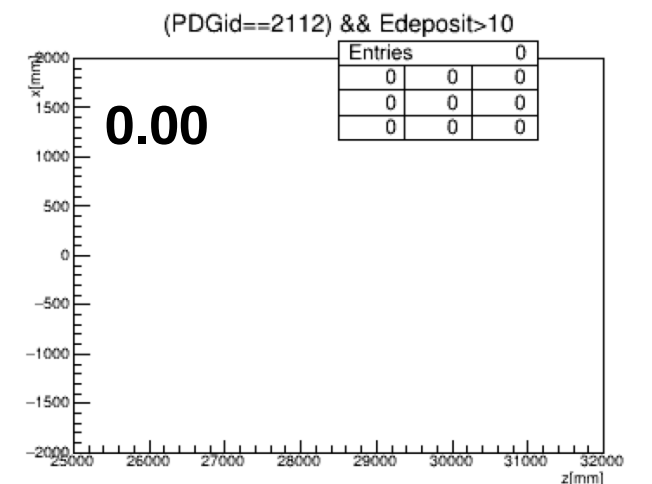
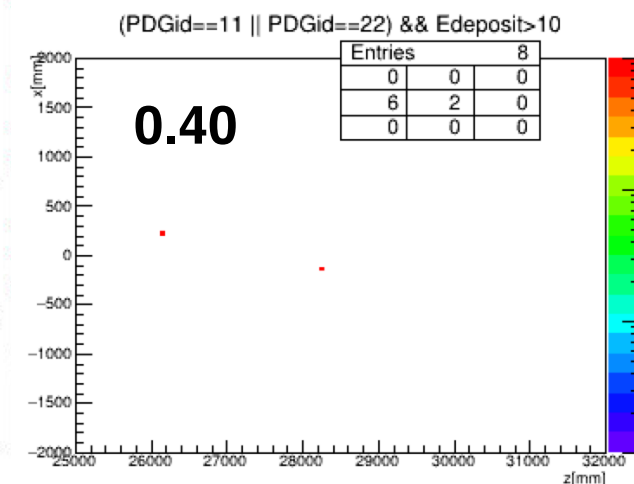
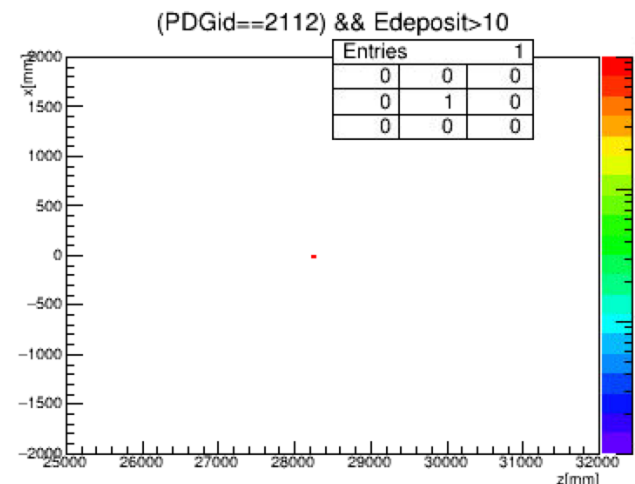
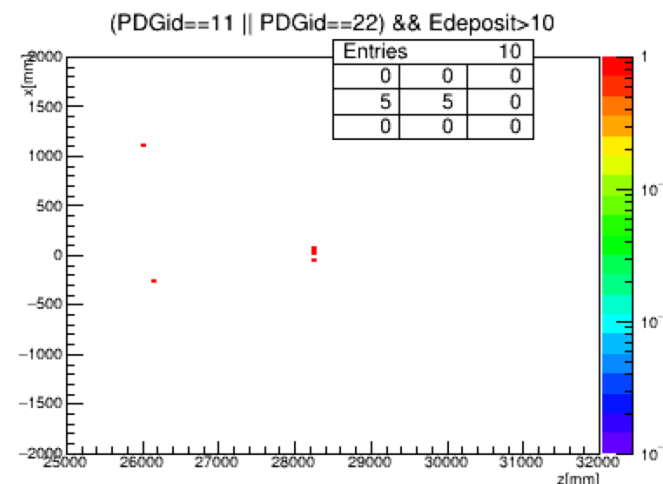
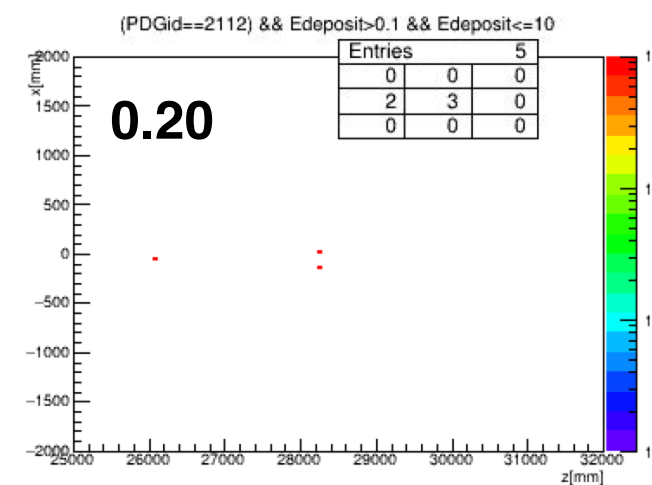
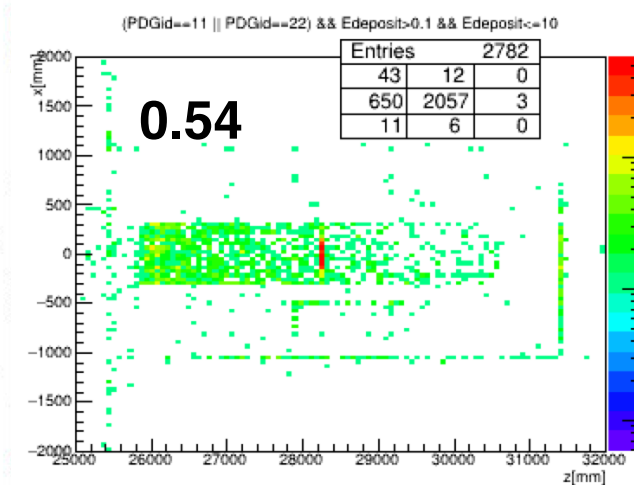
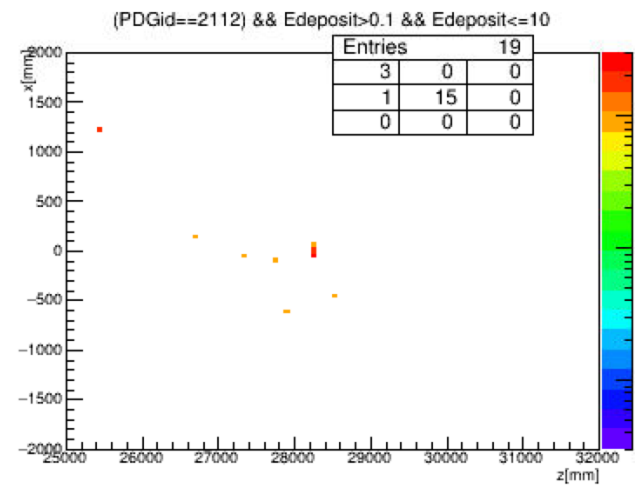
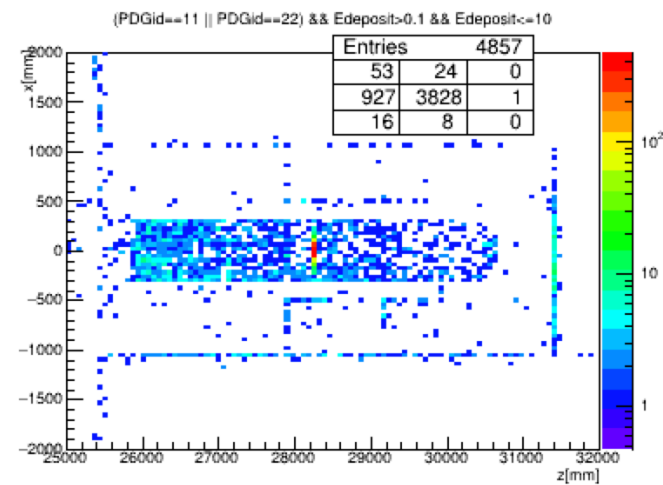
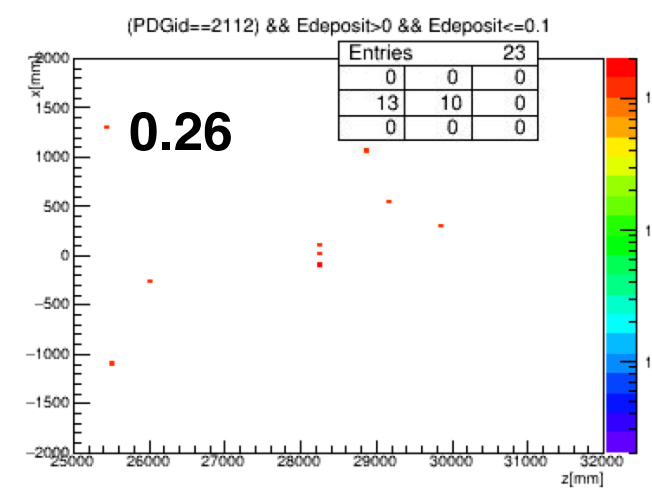
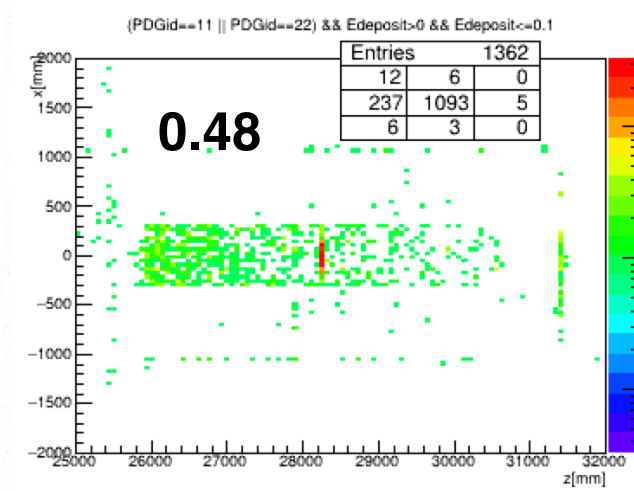
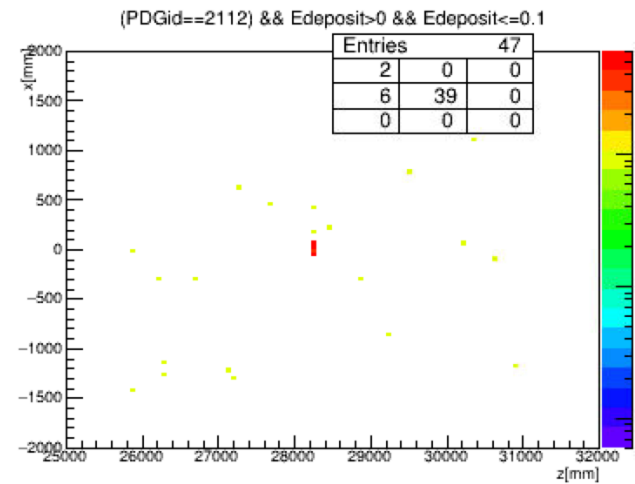
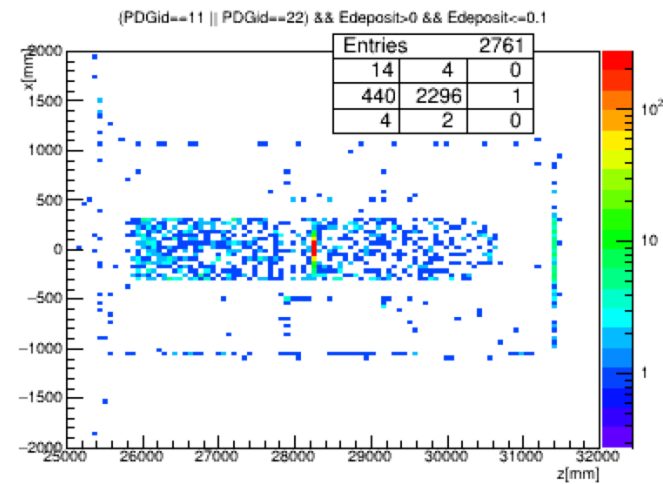
PREX2 - comparison

current setup



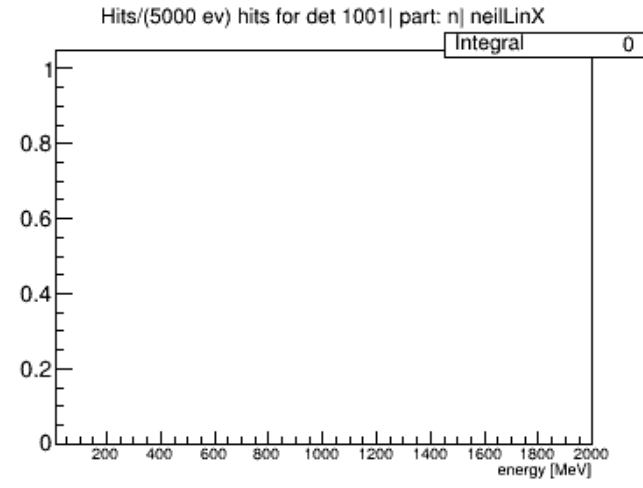
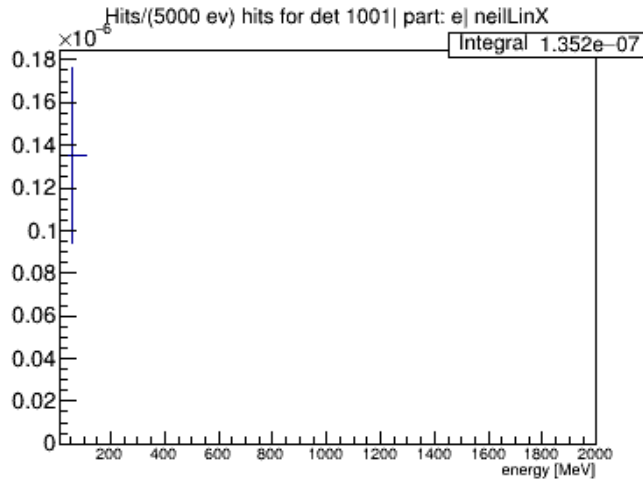
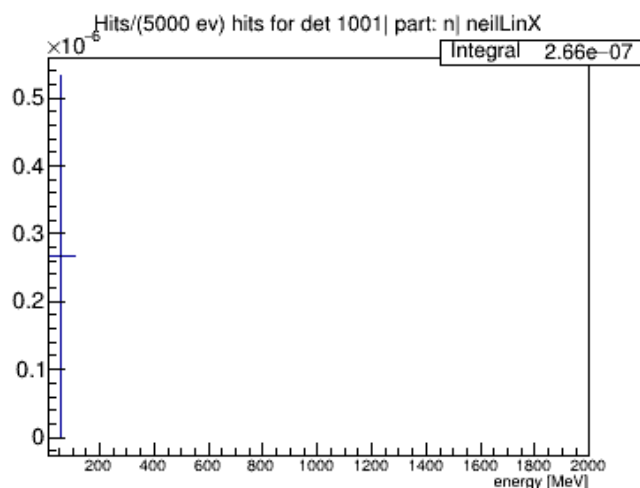
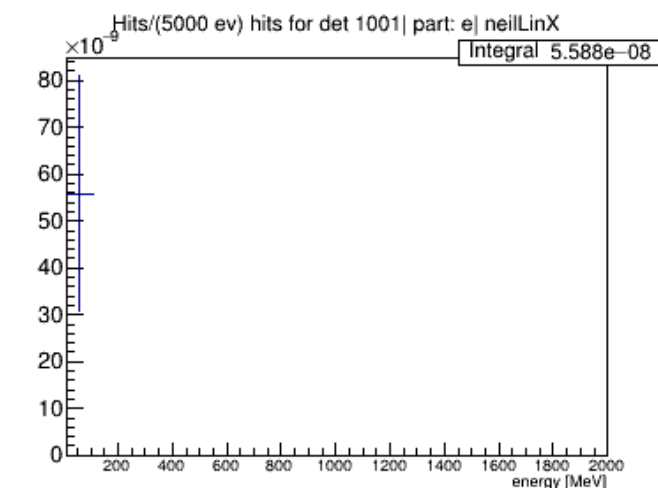
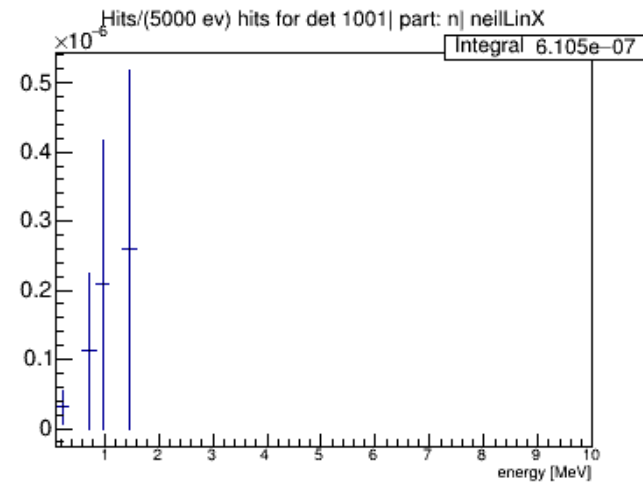
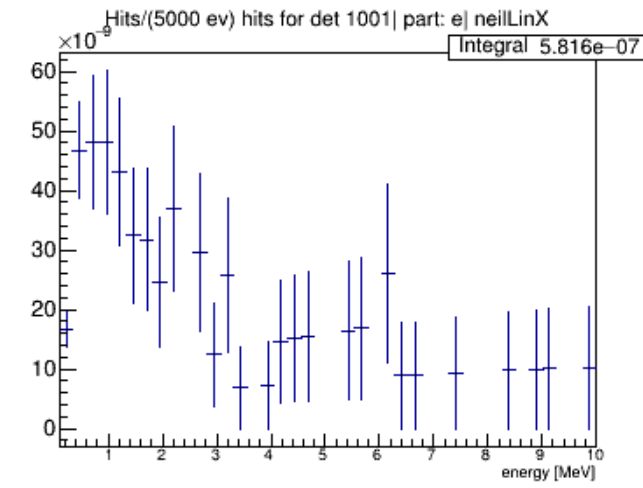
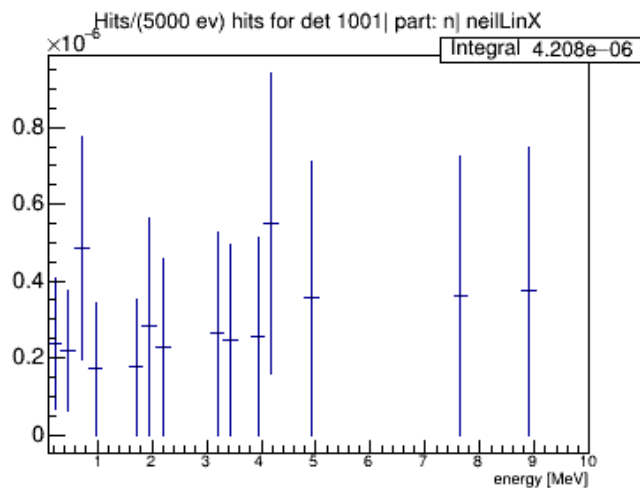
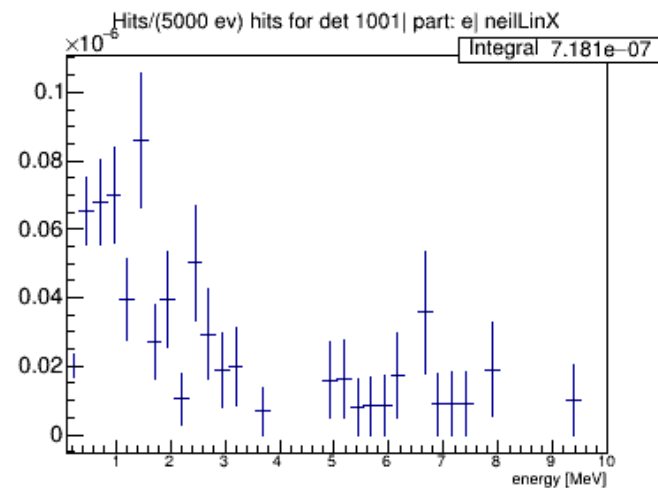
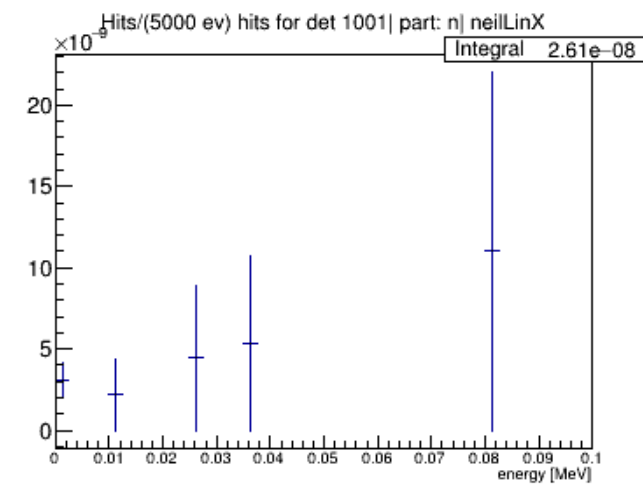
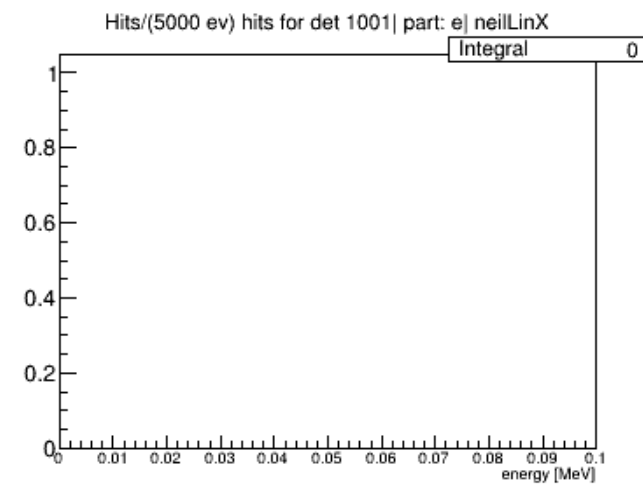
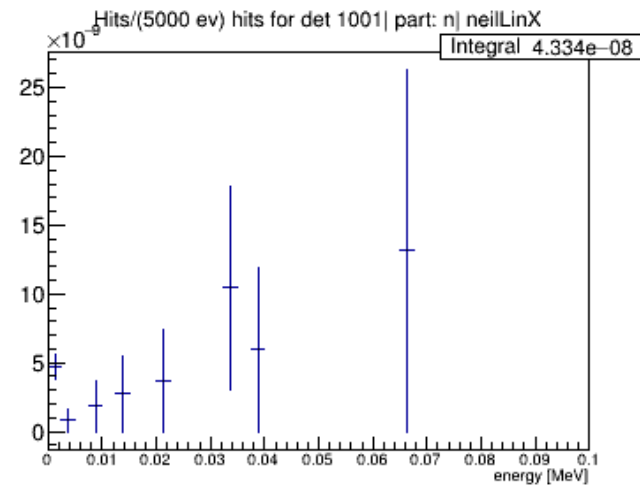
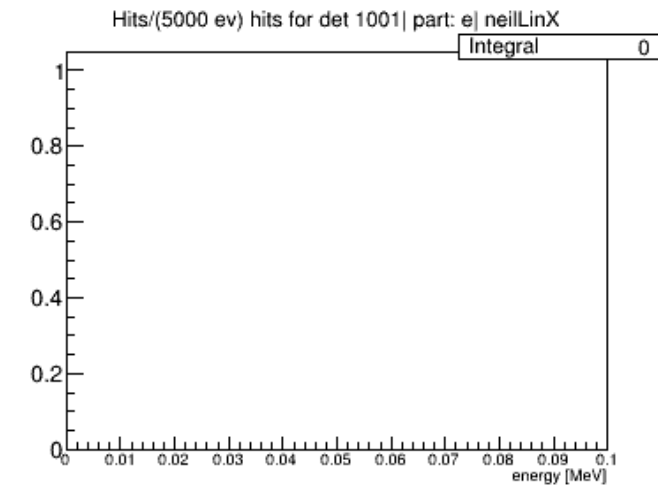
CREX - comparison

current setup



CREX - comparison

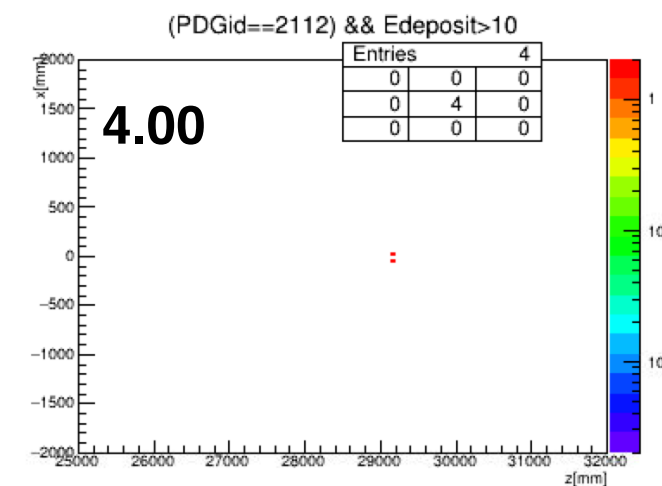
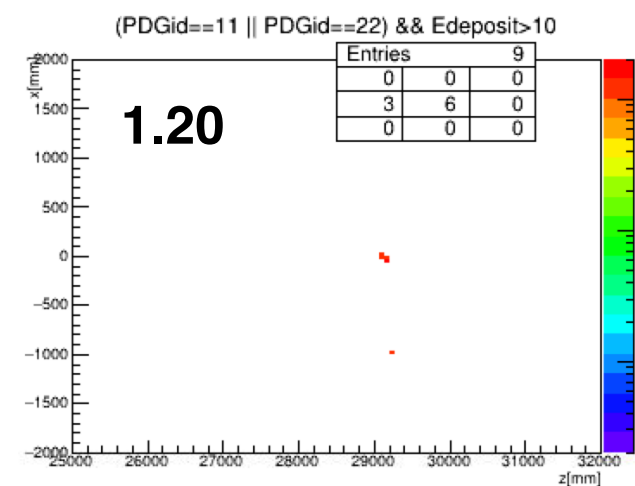
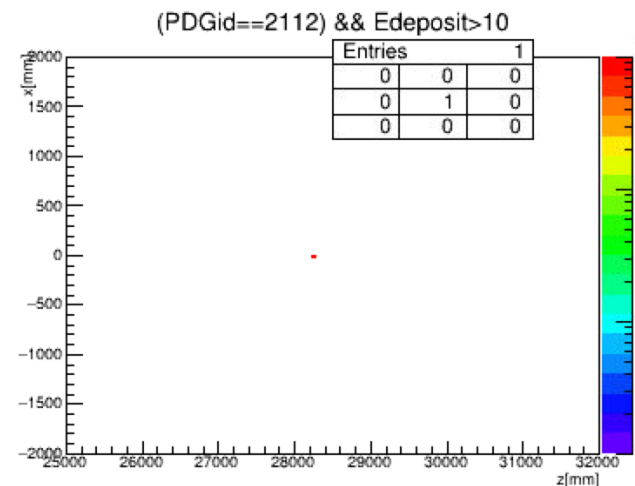
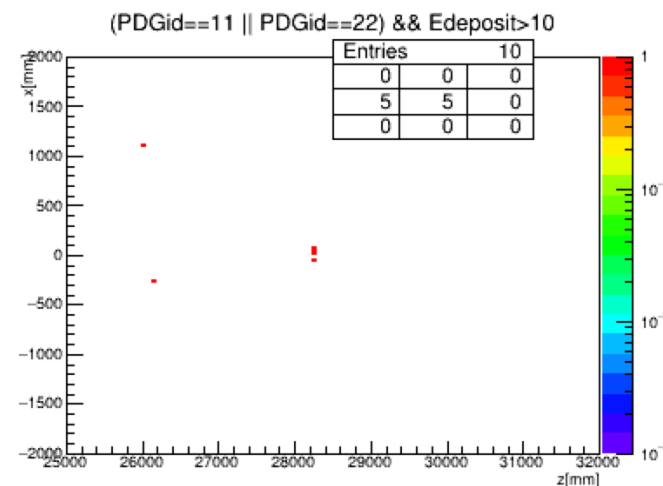
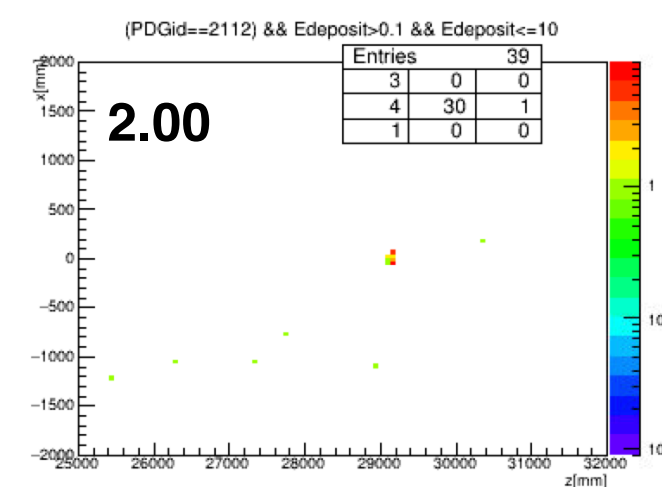
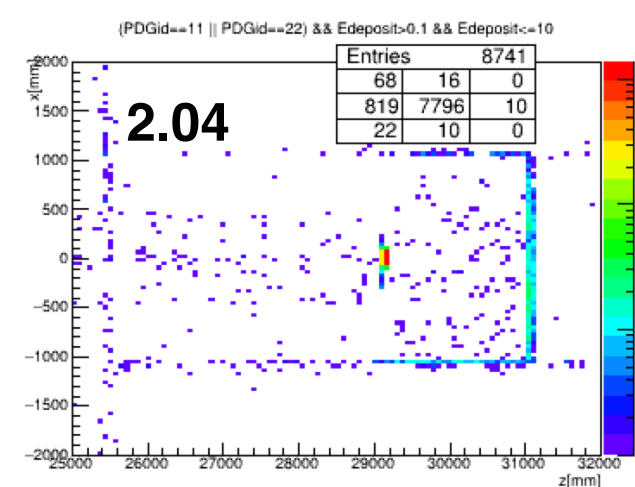
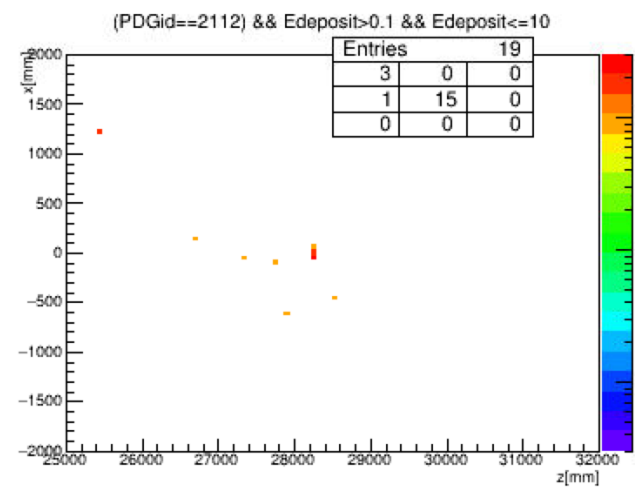
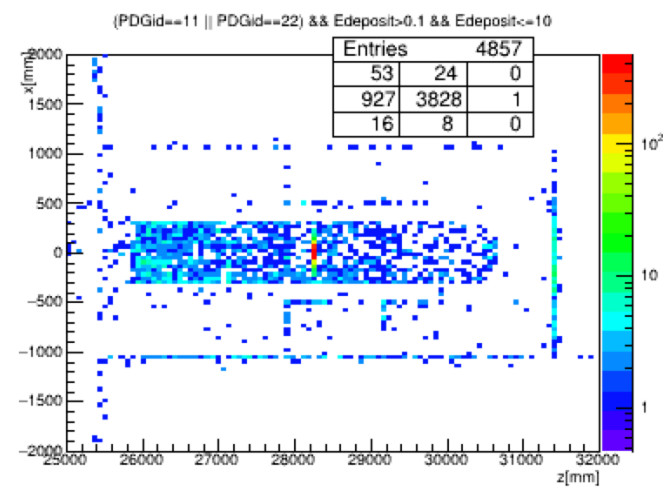
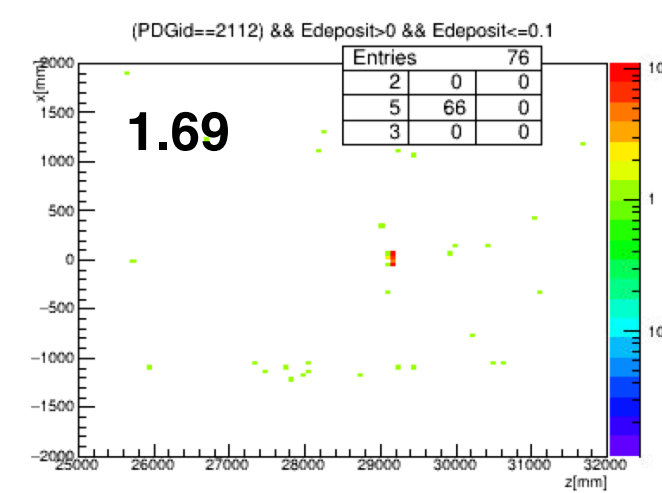
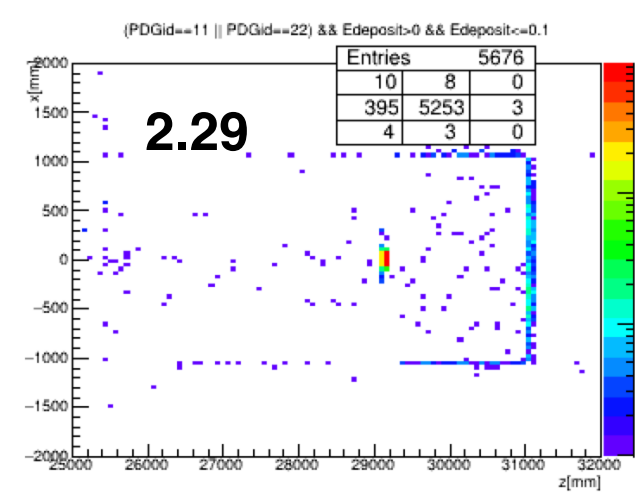
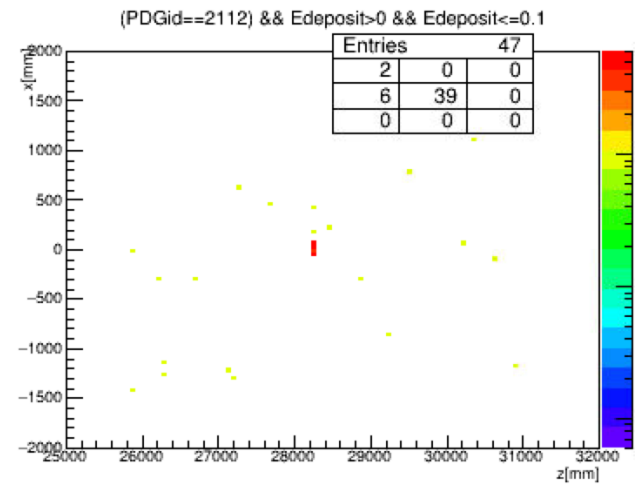
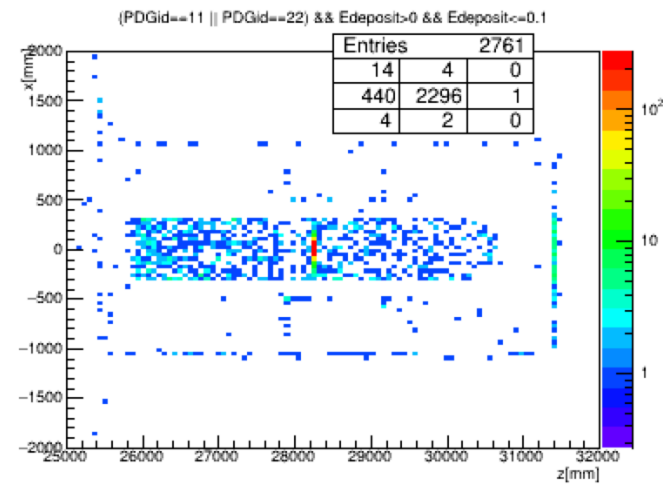
current setup



current setup + 4 in donut

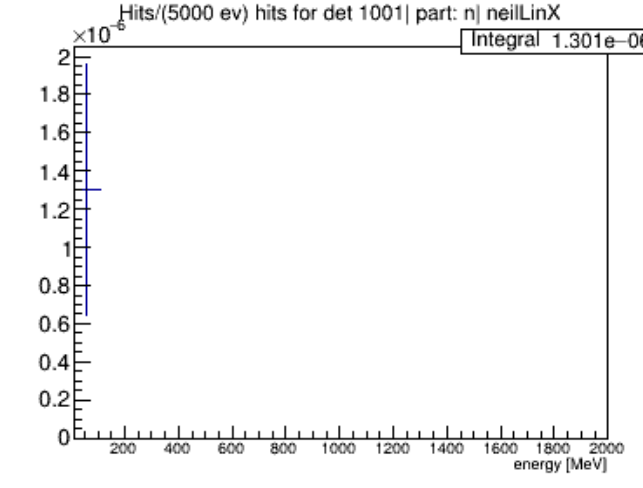
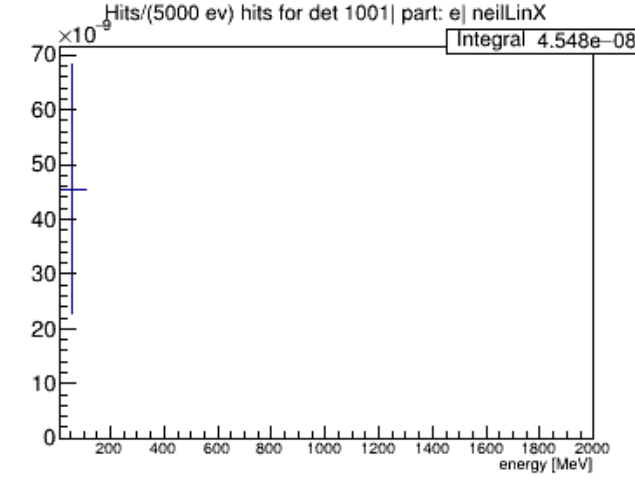
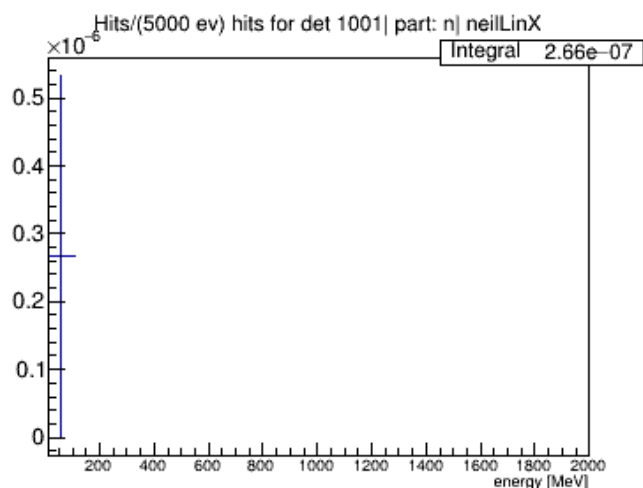
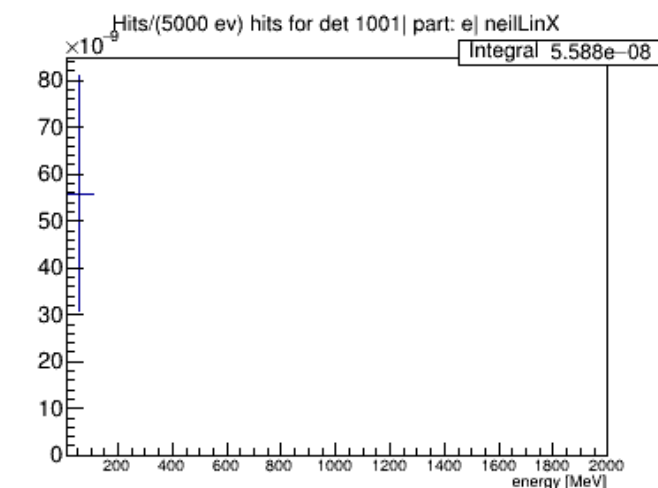
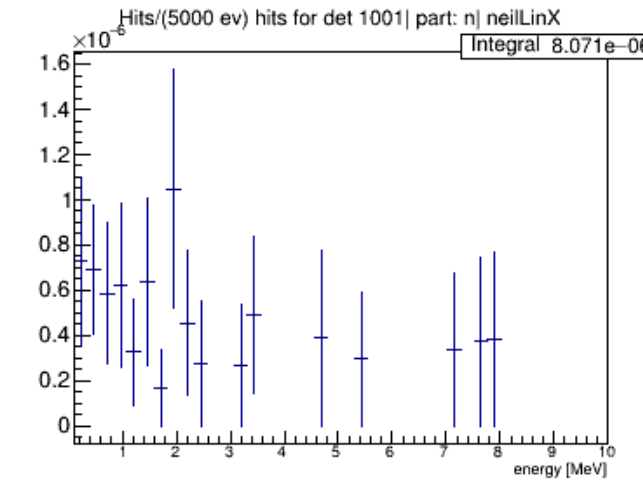
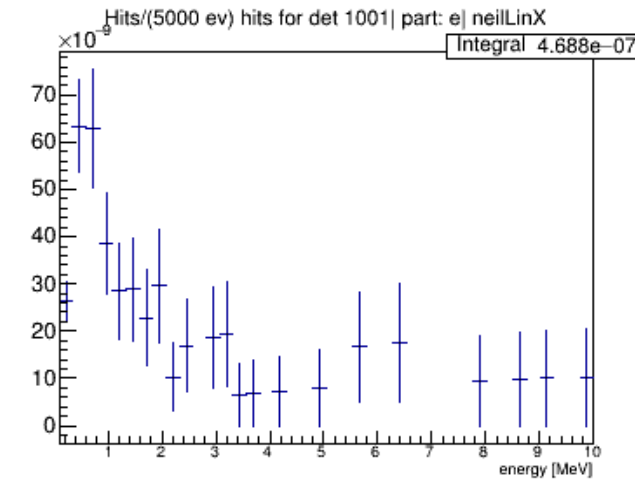
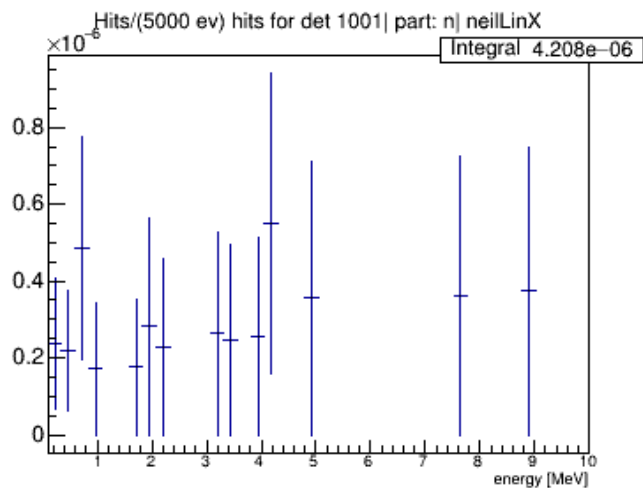
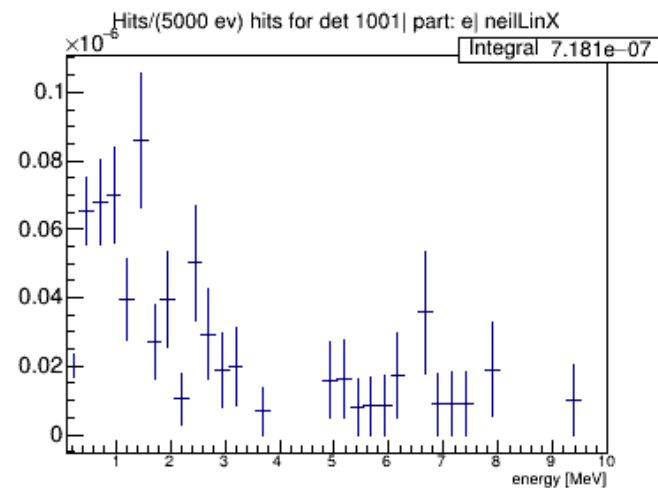
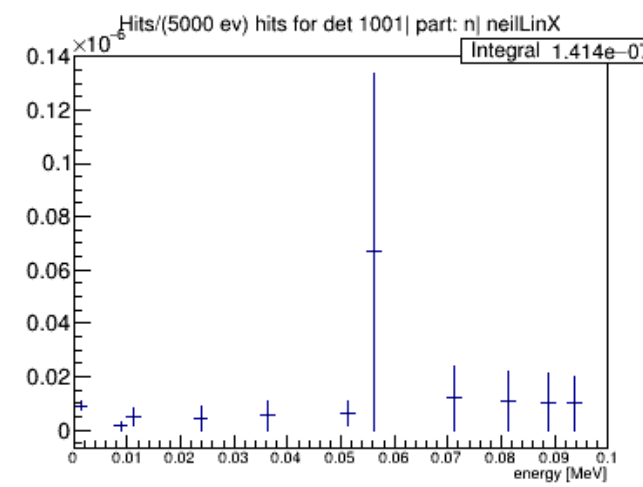
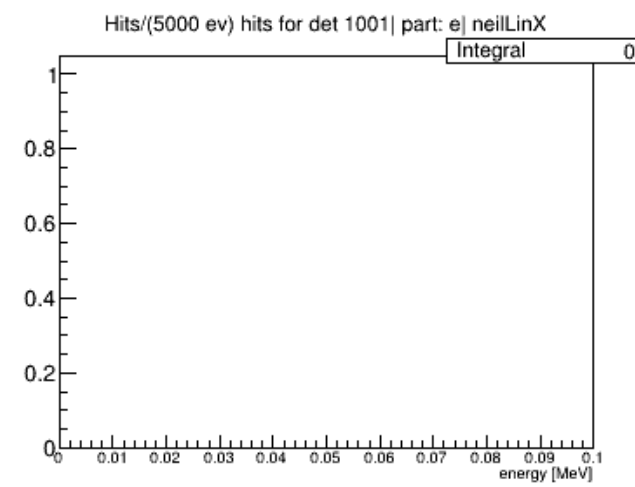
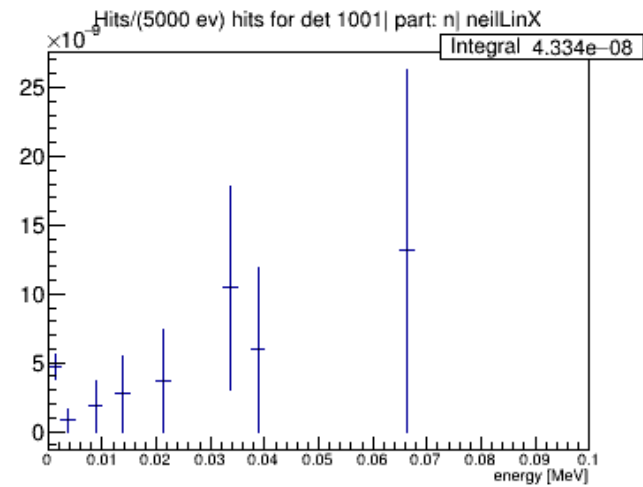
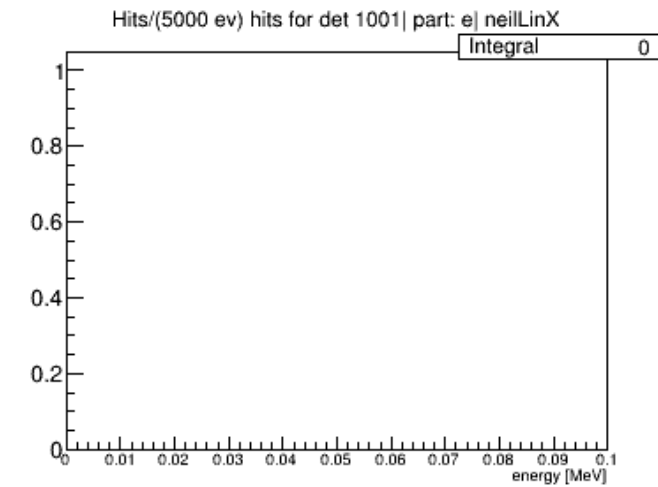
CREX - comparison

current setup



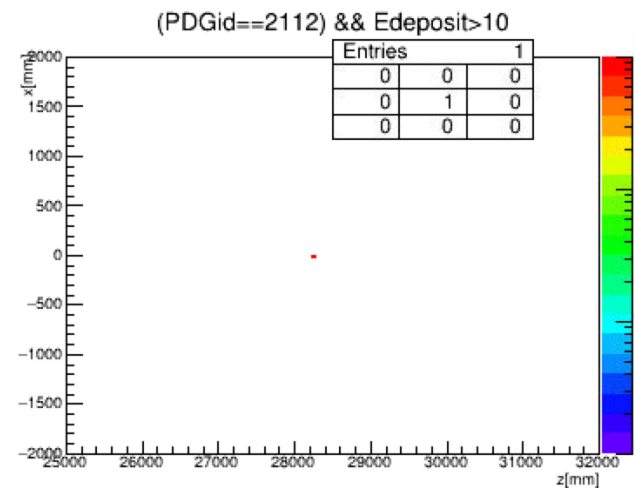
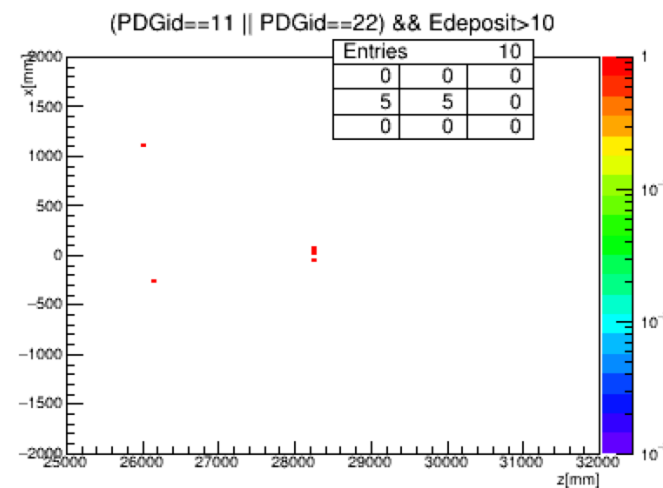
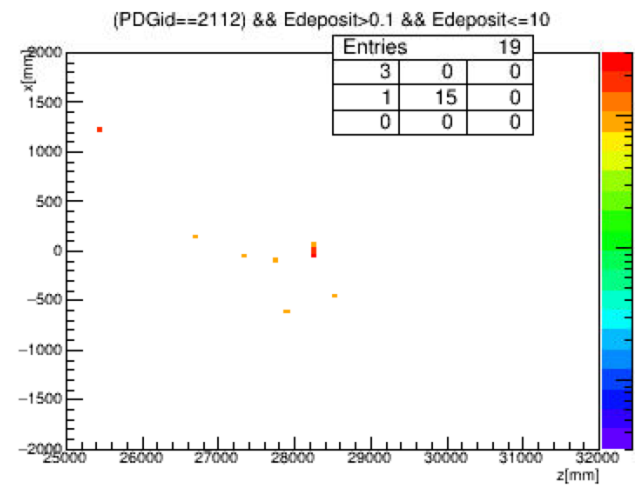
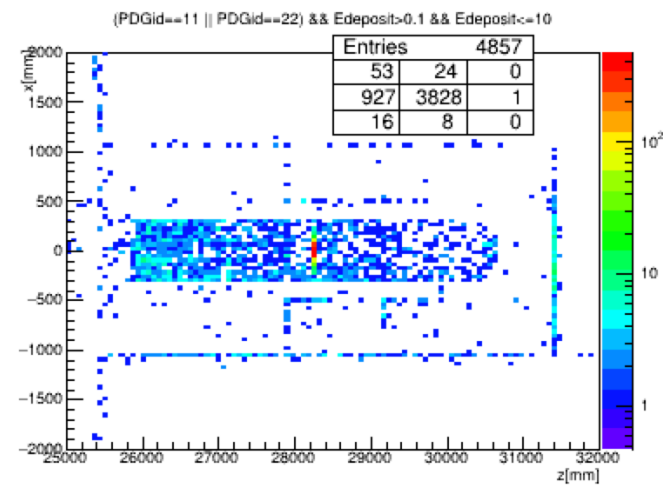
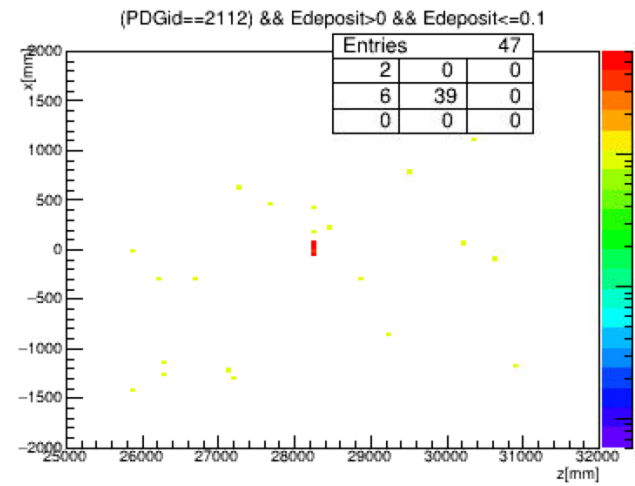
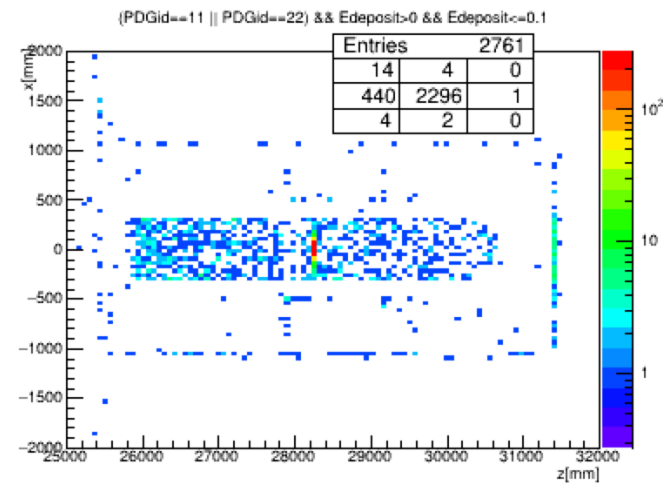
CREX - comparison

current setup

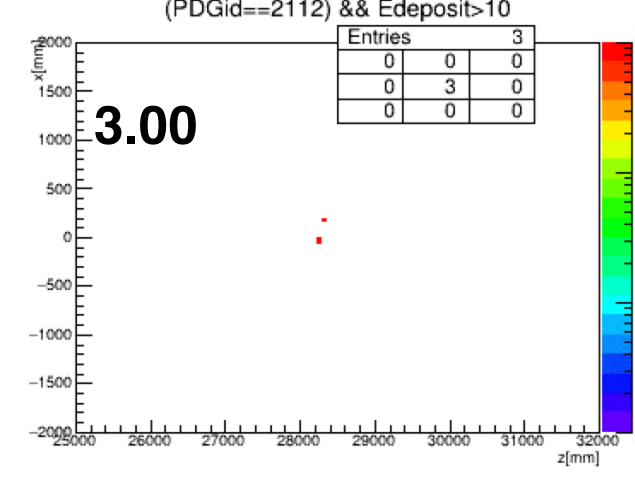
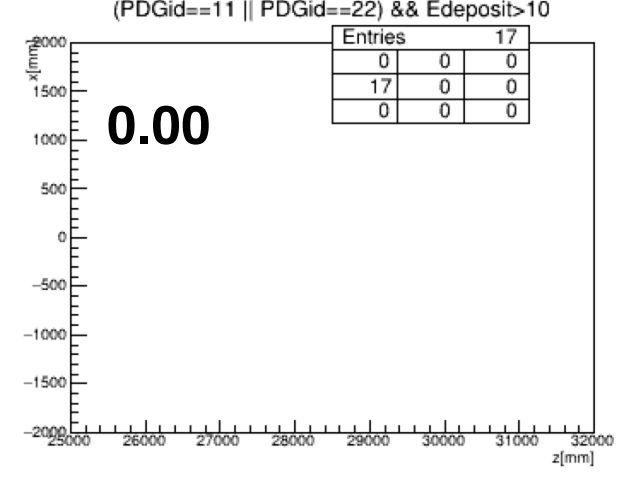
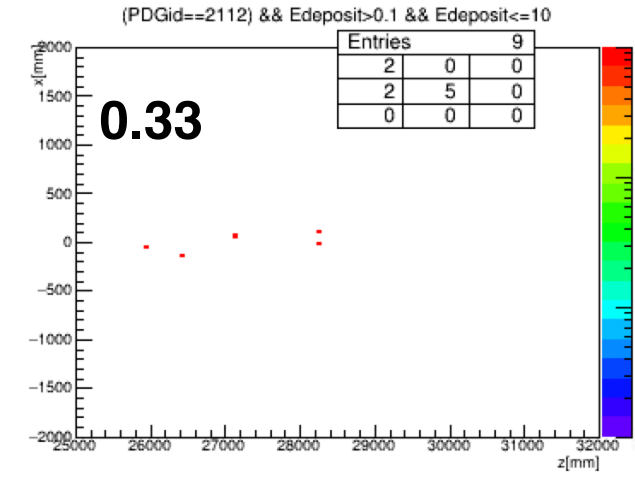
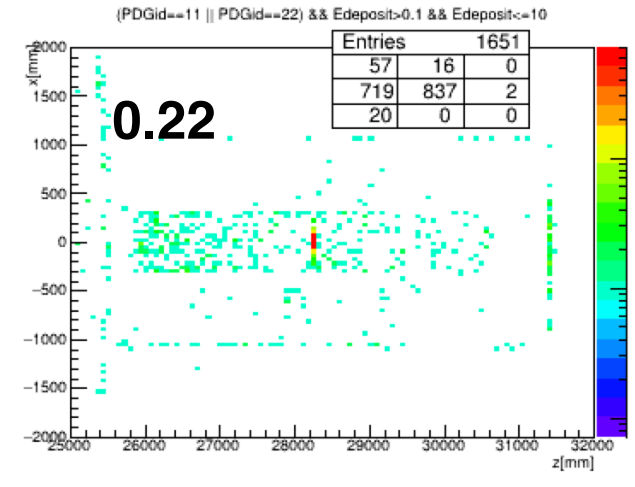
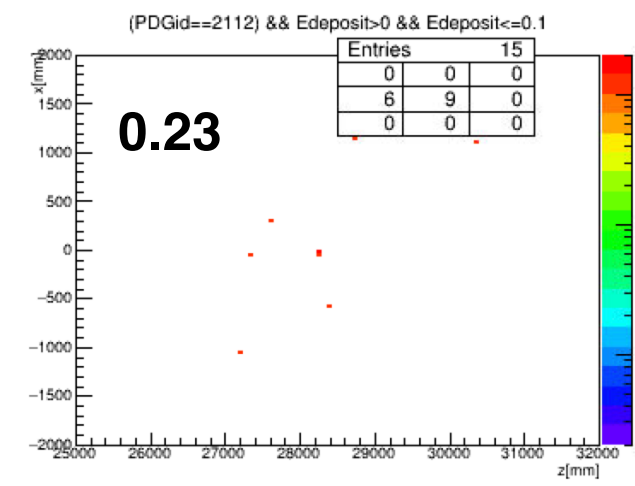
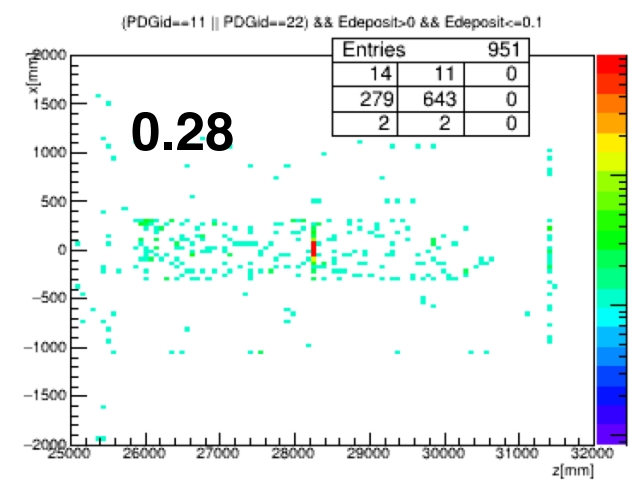


CREX - comparison

current setup

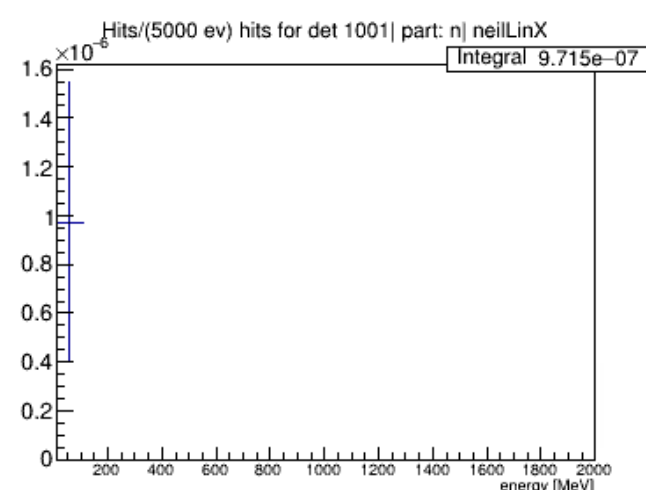
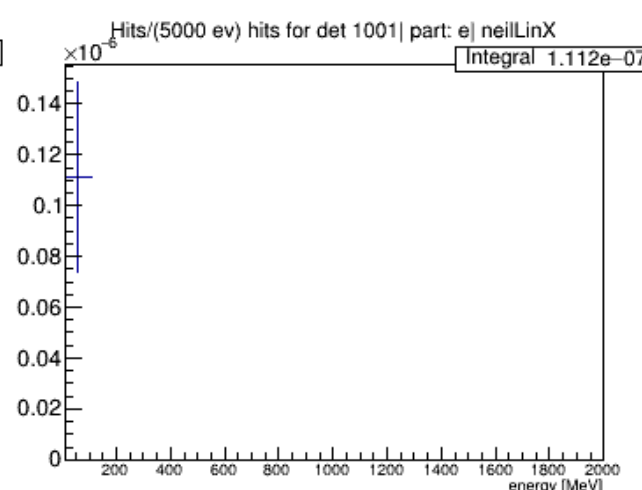
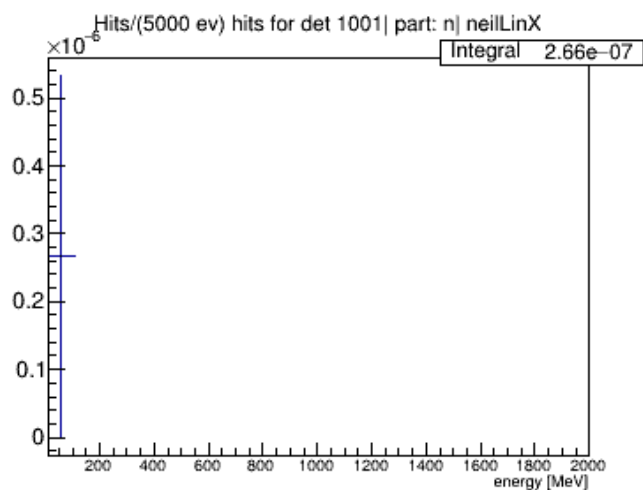
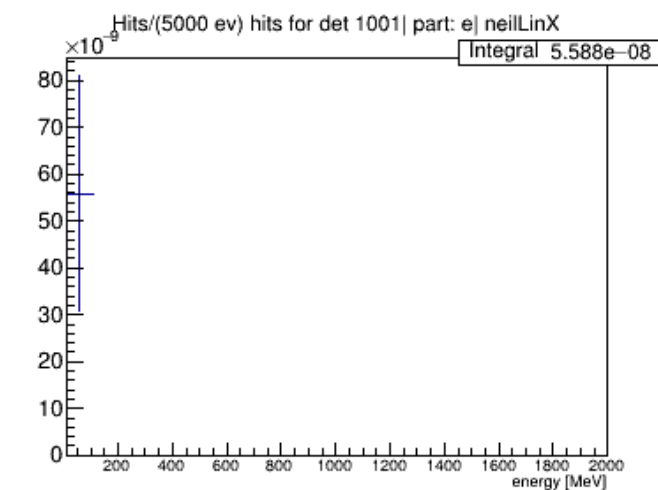
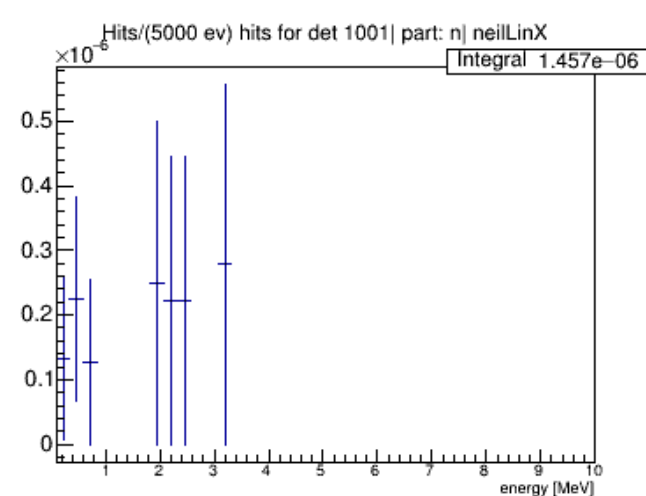
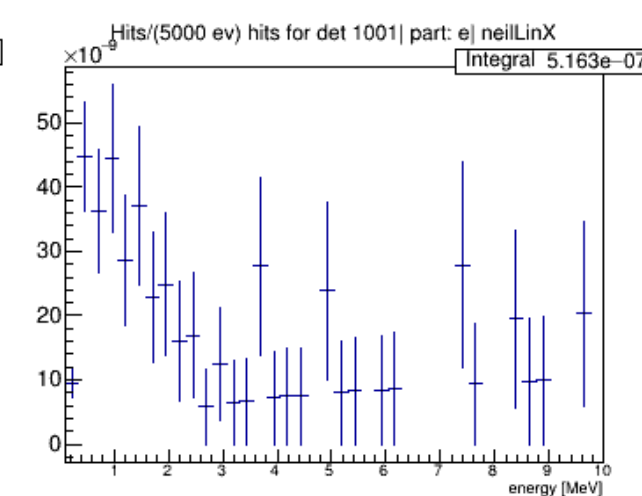
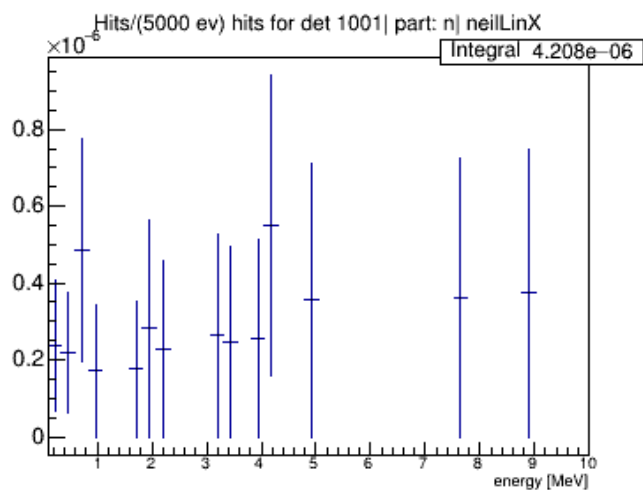
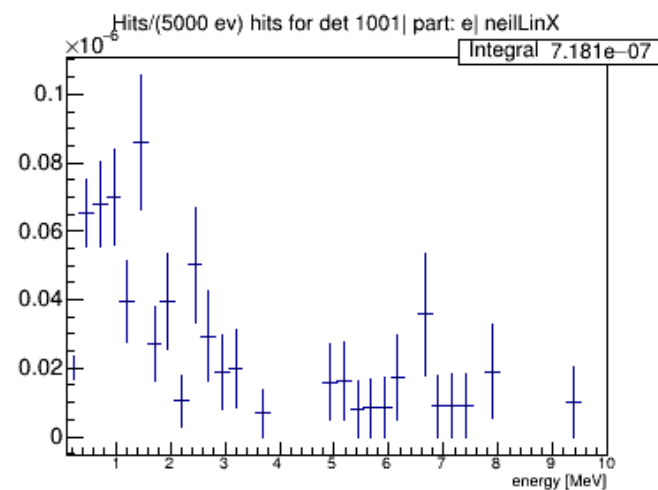
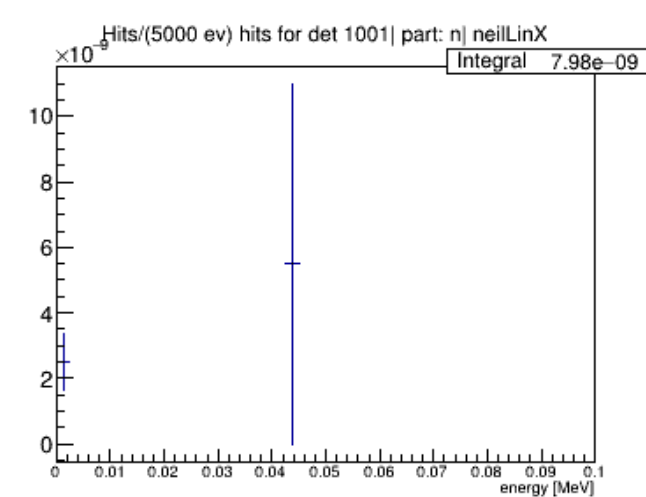
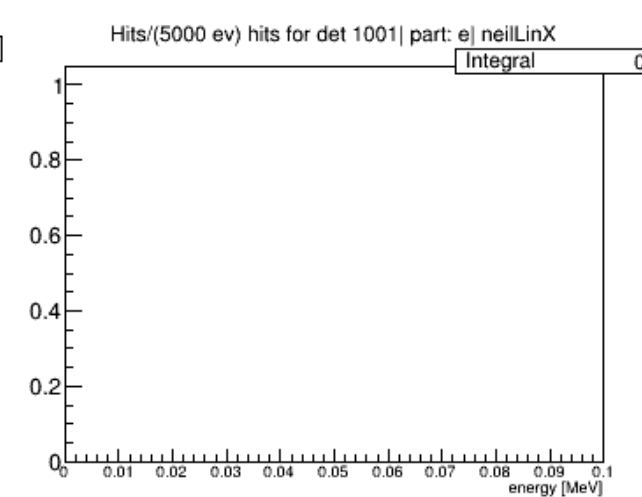
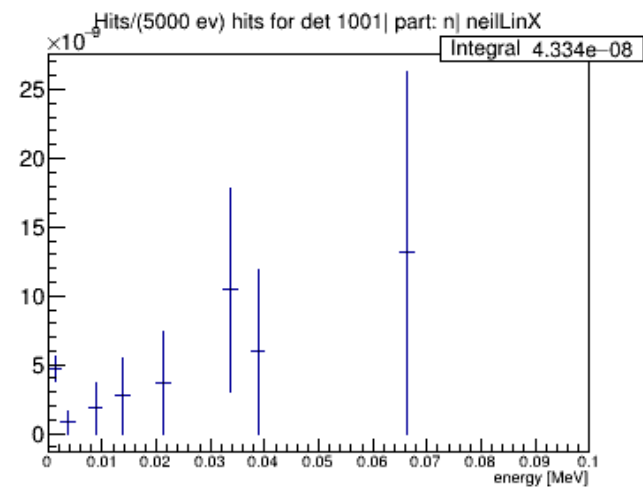
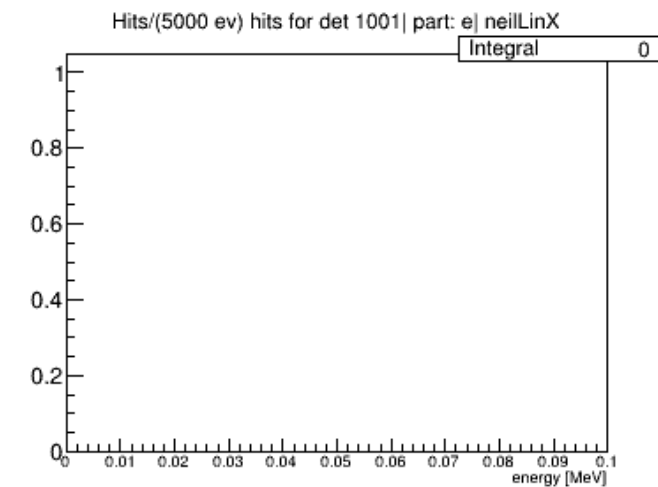


current setup + 1 ft concrete shield



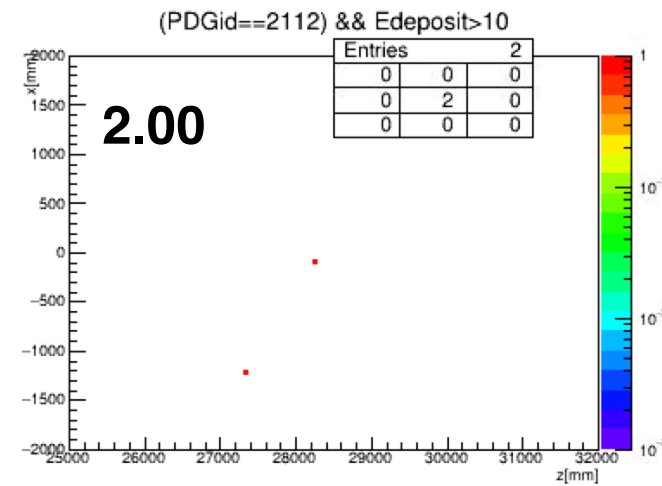
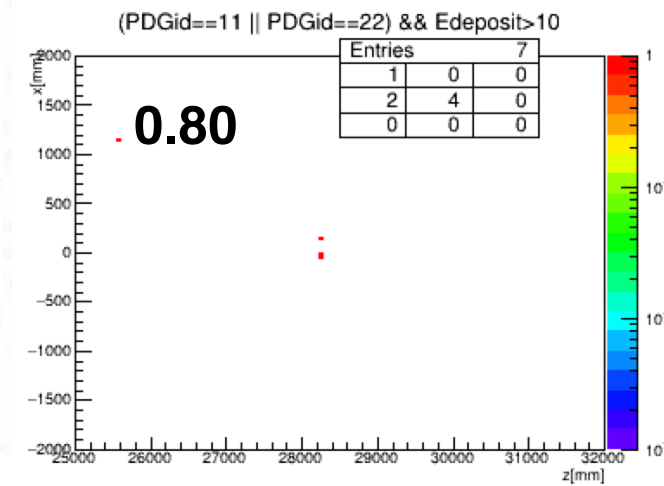
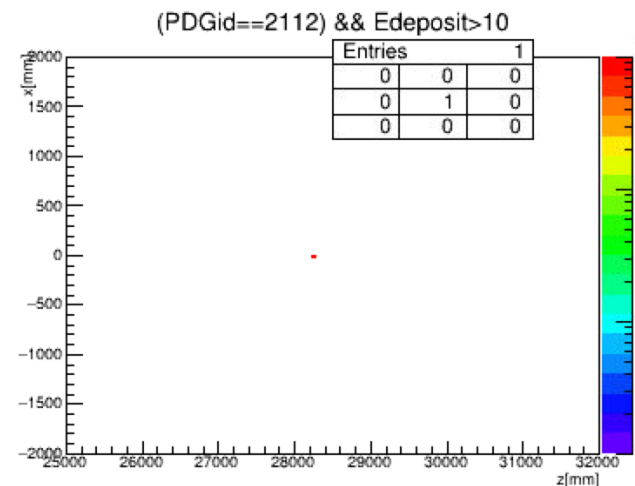
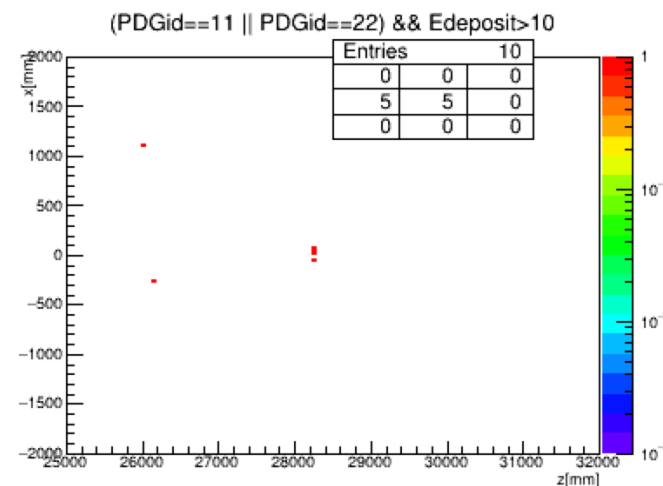
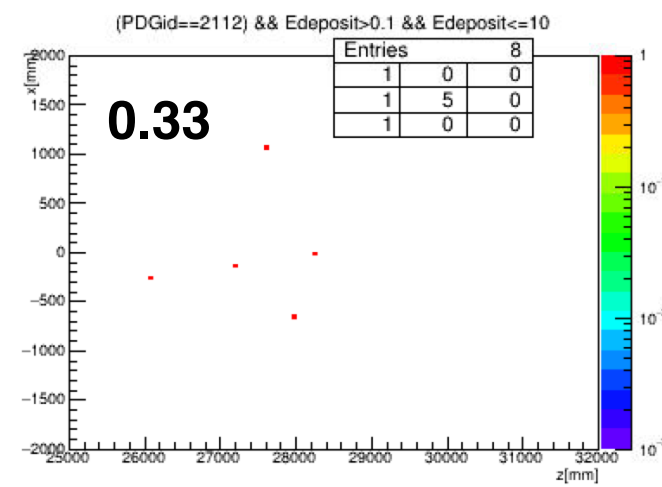
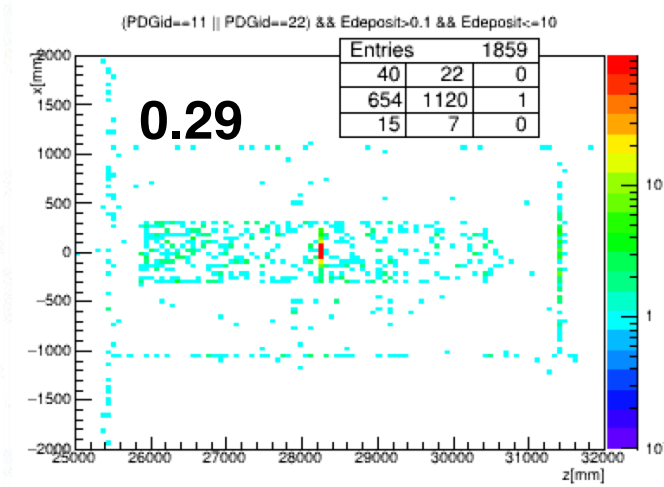
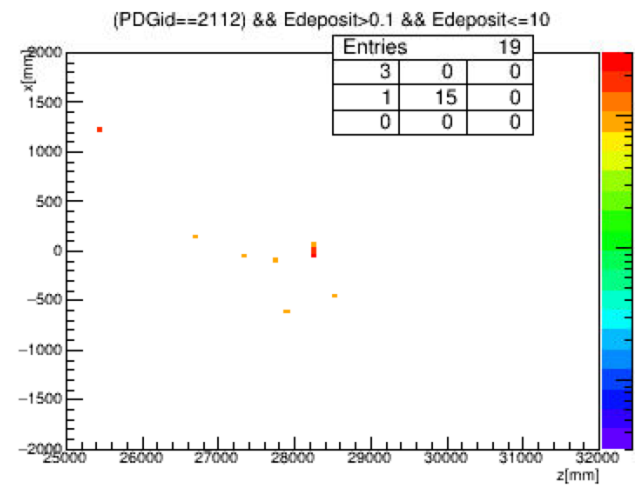
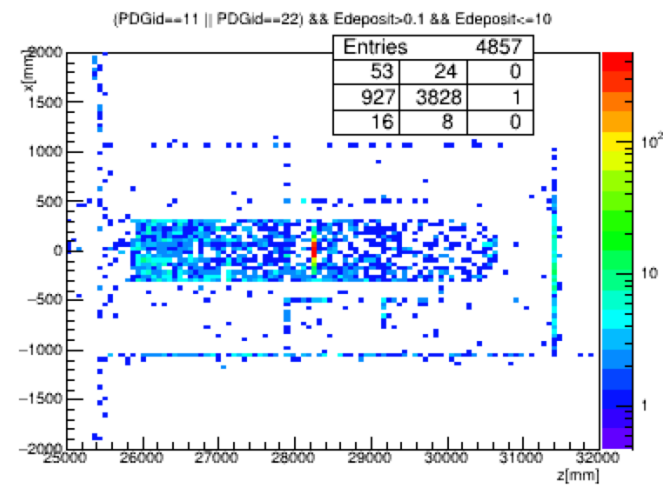
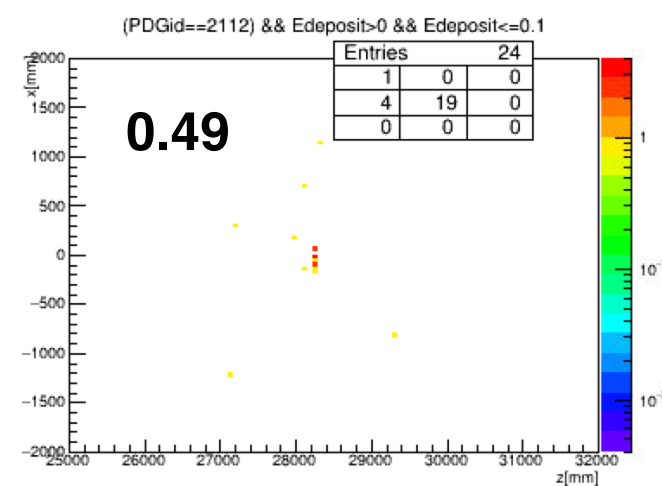
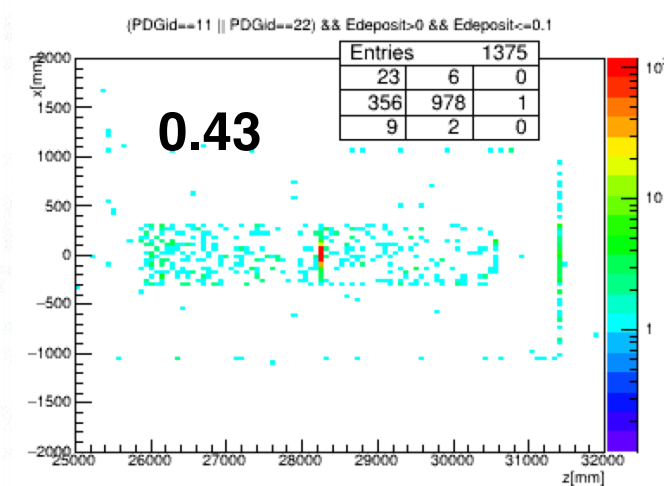
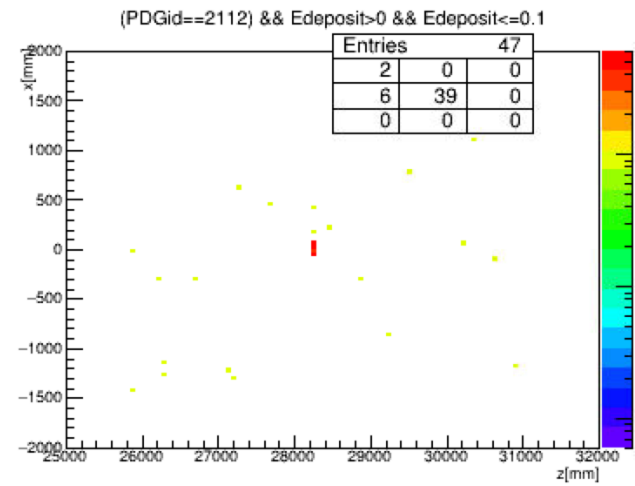
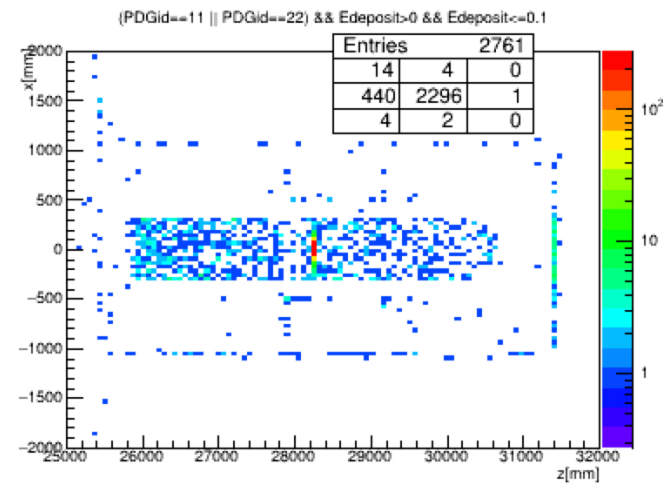
CREX - comparison

current setup



CREX - comparison

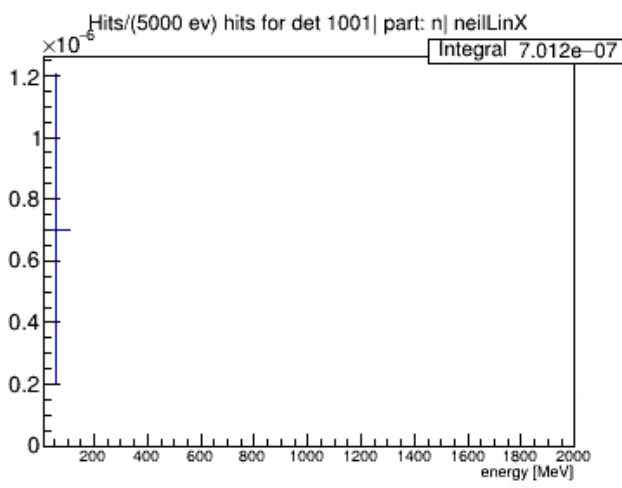
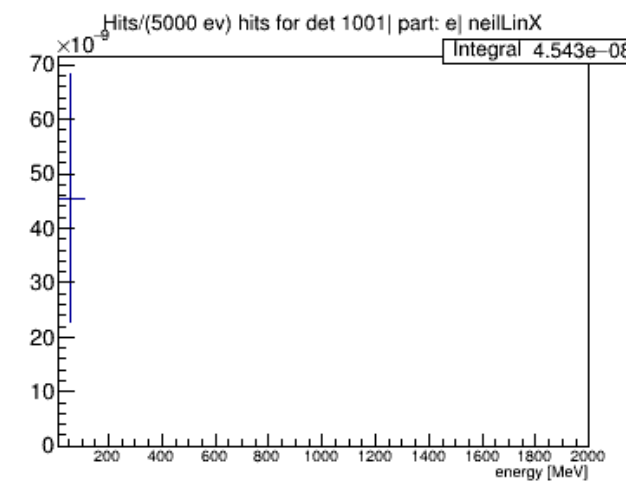
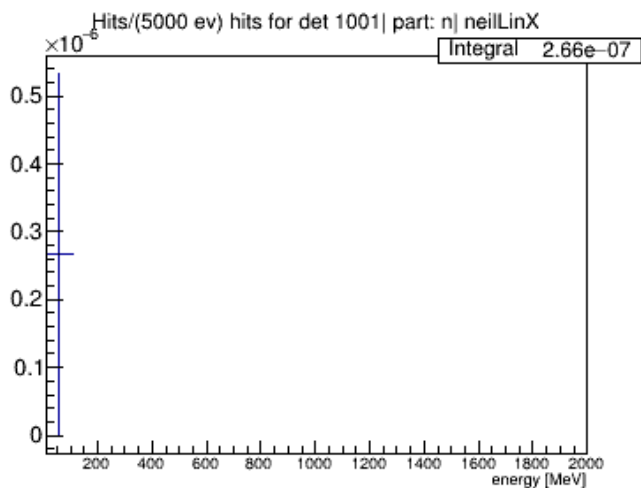
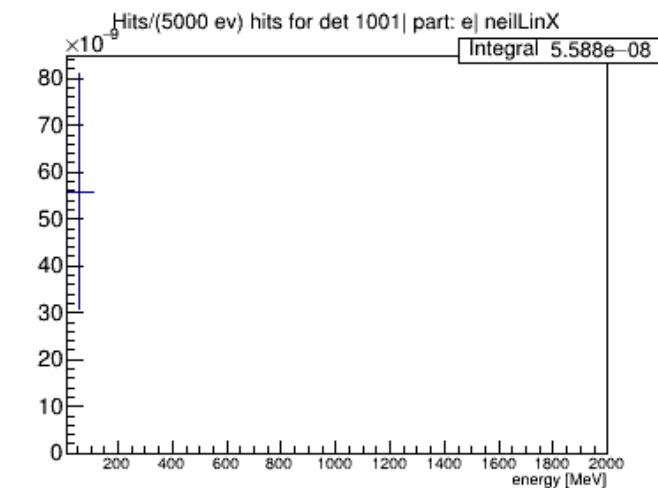
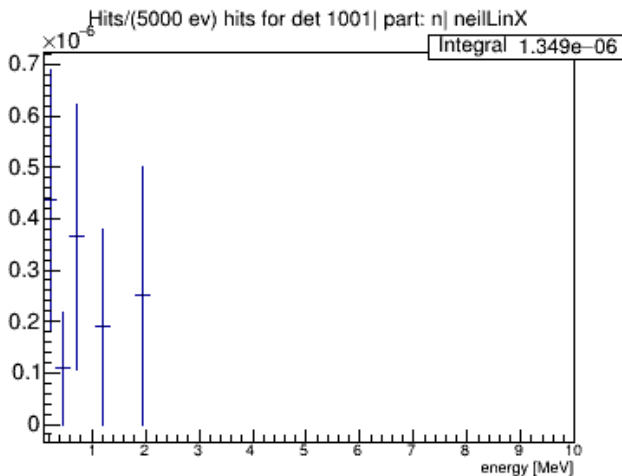
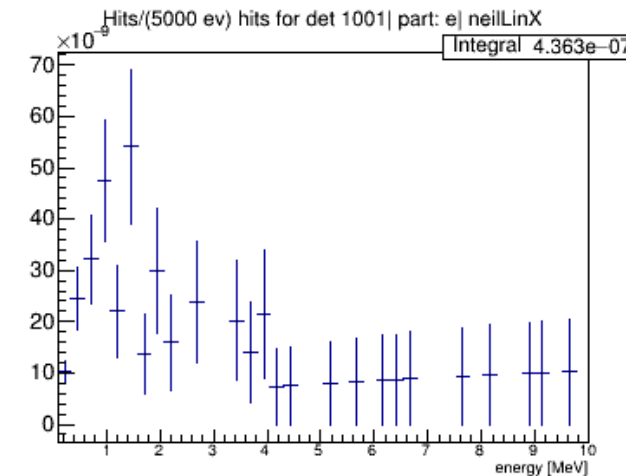
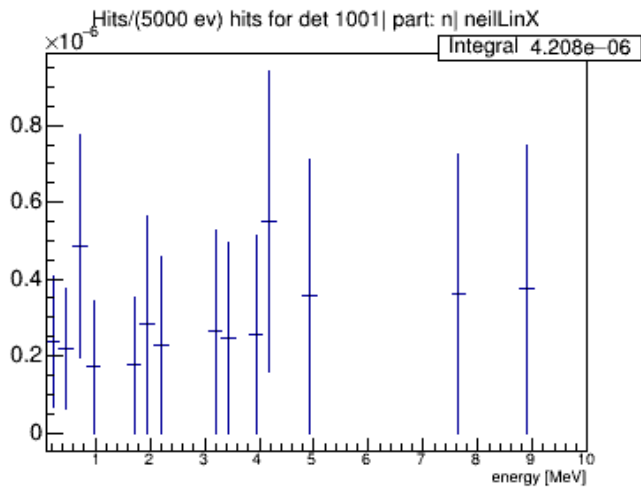
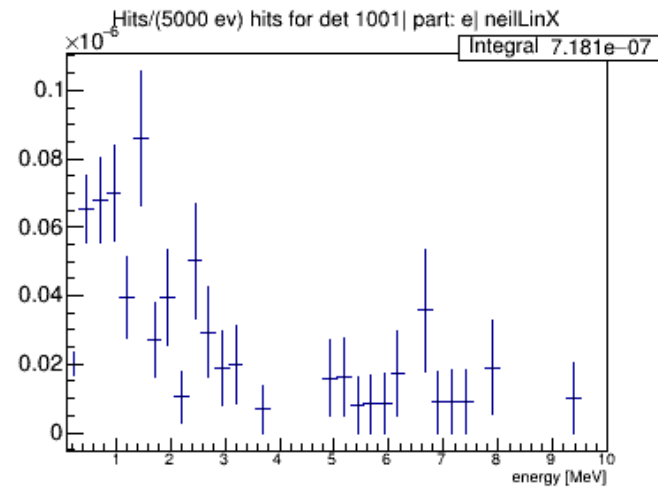
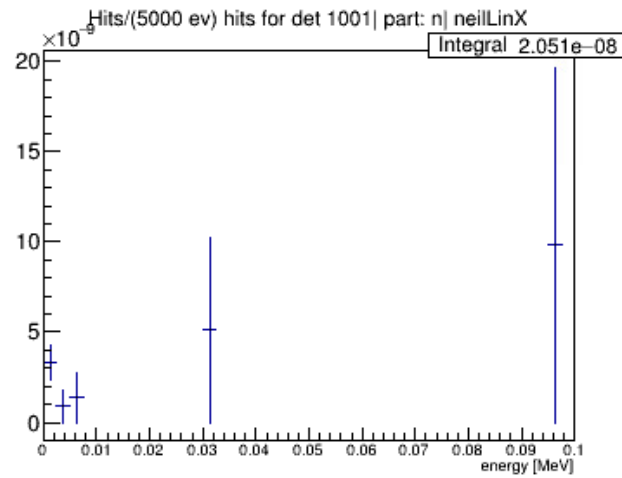
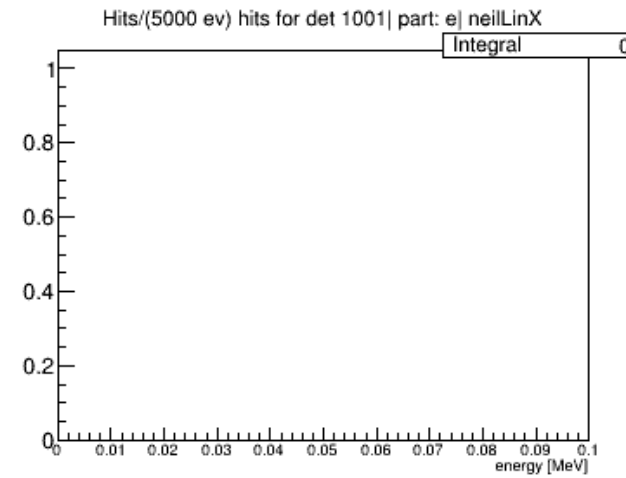
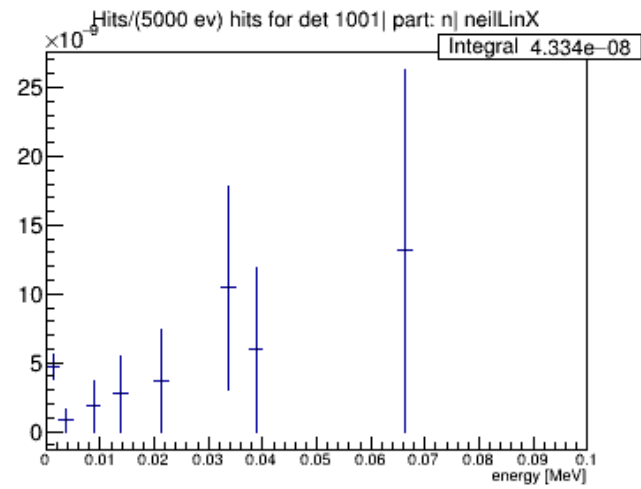
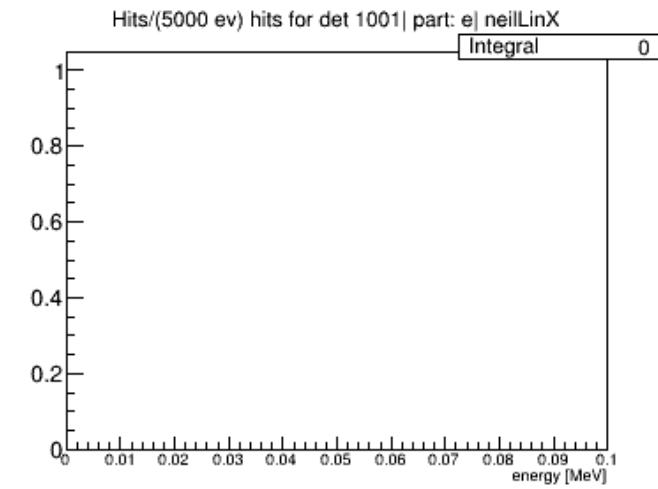
current setup



current setup + 1 ft Poly shield

CREX - comparison

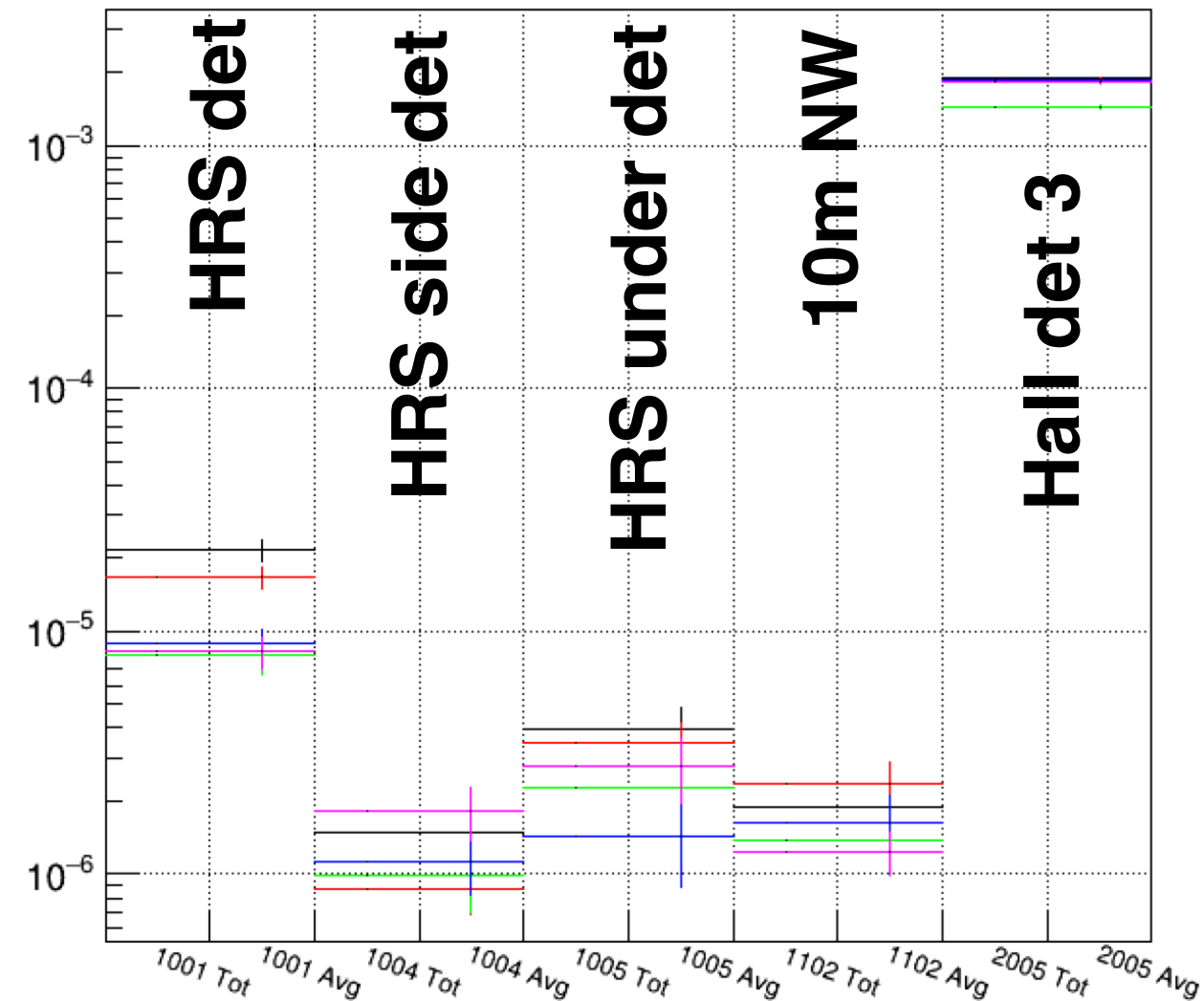
current setup



current setup + 1 ft Poly shield

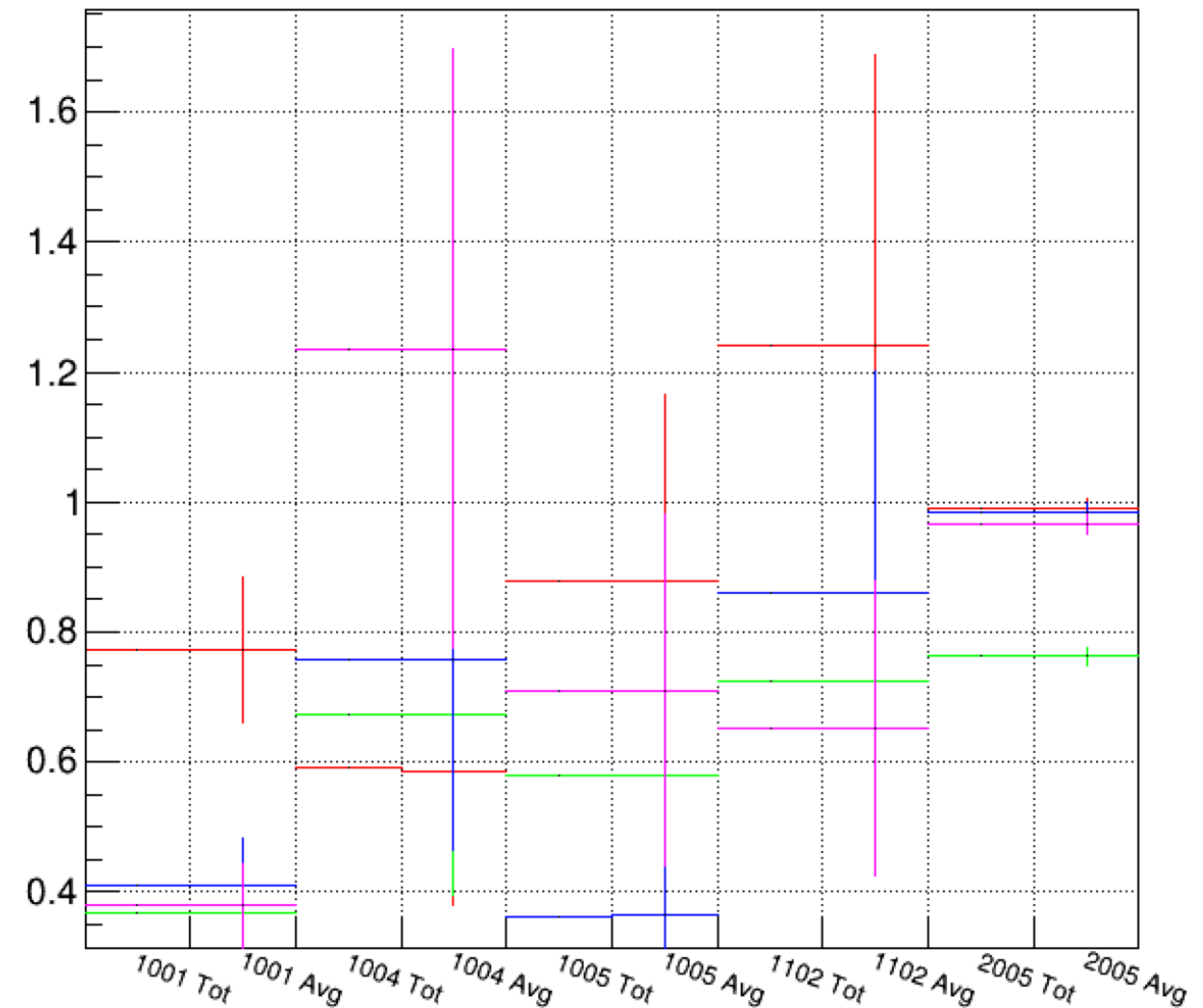
PREX2 - HRS rad damage

summary histogram per electron on target| neilLogX



Black: current setup
Red: current setup + 4 in donut
Green: PREX 1 dump
Blue: current setup + concrete Shield
Magenta: current setup + Poly Shield

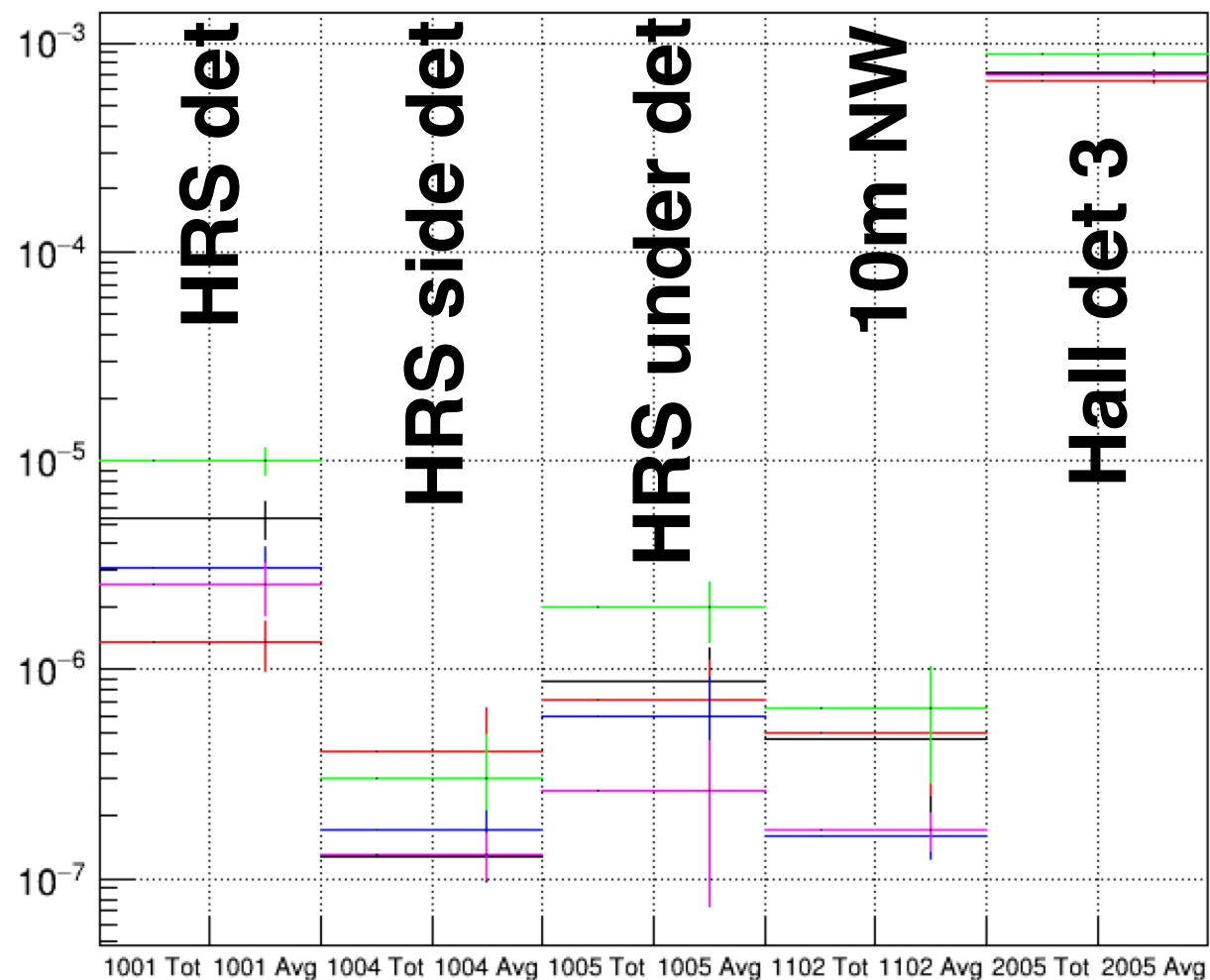
summary histogram per electron on target| neilLogX



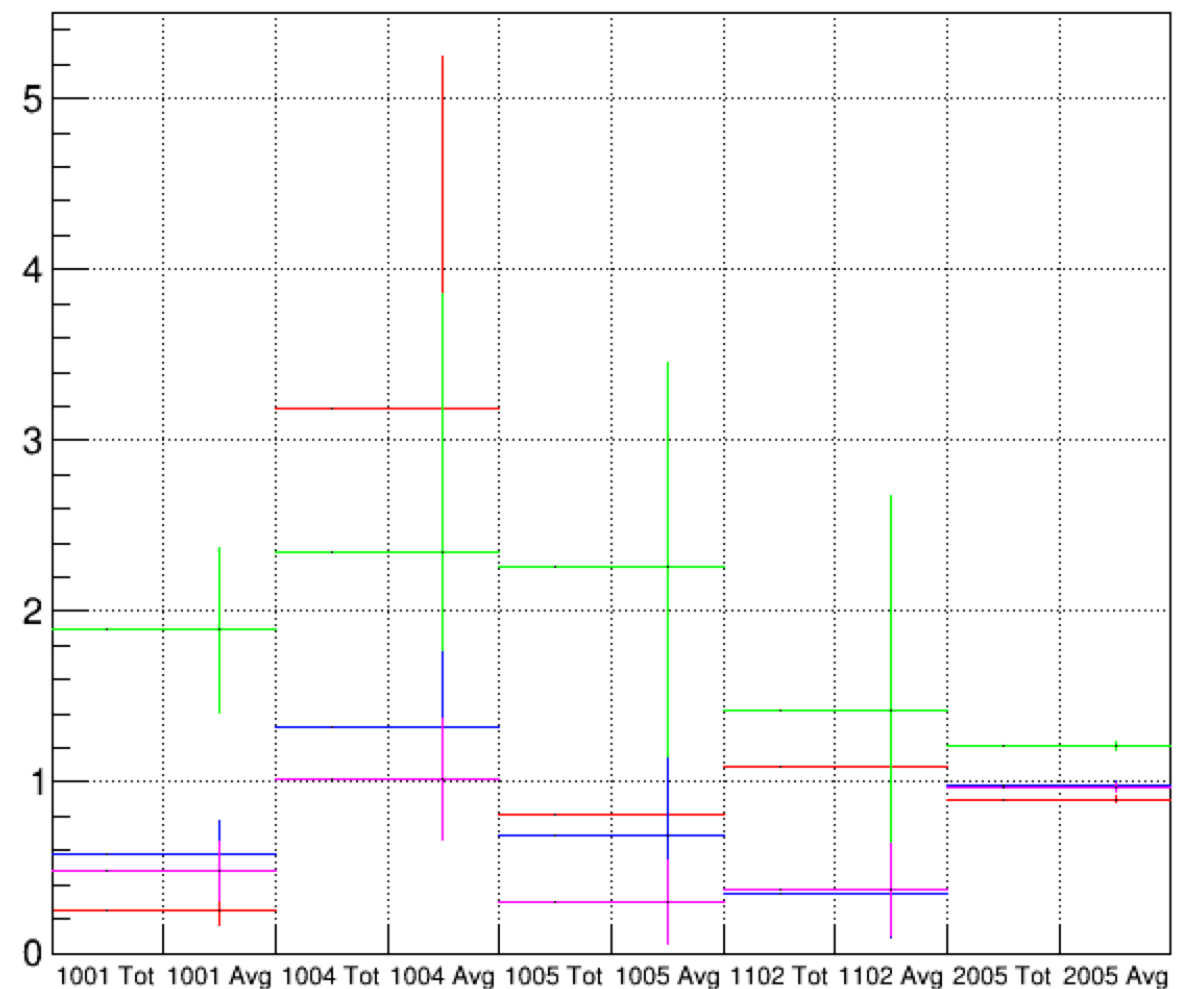
- Best configuration seems to be the PREX1 beam pipe, followed closely by the current pipe with shielding

CREX - HRS rad damage

summary histogram per electron on target| neilLogX



summary histogram per electron on target| neilLogX



Black: current setup

Red: current setup + 4 in donut

Green: PREX 1 dump

Blue: current setup + concrete Shield

Magenta: current setup + Poly Shield

- For CREX having a large aperture can provide significant improvement

HRS radiation - entire run

HRS detector	Total NEIL/cm2	uncert	Ration to P1	uncert
PREX1	4.60E+10	1.79E+09	1.00	0.06
PREX2 ERR	4.96E+09	6.72E+08	0.11	0.02
CREX ERR	6.73E+09	2.05E+09	0.15	0.04
PREX2 current	5.77E+10	5.69E+09	1.25	0.13
P2 with P1pipe	2.12E+10	3.38E+09	0.46	0.08
P2 current+4in	4.46E+10	4.64E+09	0.97	0.11
P2 current+Conc	2.38E+10	3.44E+09	0.52	0.08
P2 current+Poly	2.19E+10	3.09E+09	0.48	0.07
C5 current	3.86E+10	7.80E+09	0.84	0.17
C5 current+4in	9.86E+09	2.61E+09	0.21	0.06
C5 P1pipe	7.31E+10	1.12E+10	1.59	0.25
C5 current+Conc	2.23E+10	5.78E+09	0.49	0.13
C5 current+Poly	1.86E+10	5.13E+09	0.40	0.11

- integrating over the entire run gives similar results

Conclusions

- CREX would greatly benefit from an increased aperture
- Both experiment would see significant reductions to our HRS platform detector with either concrete or poly
- it may be useful to put in the steel wall and remake the hrs platform detector