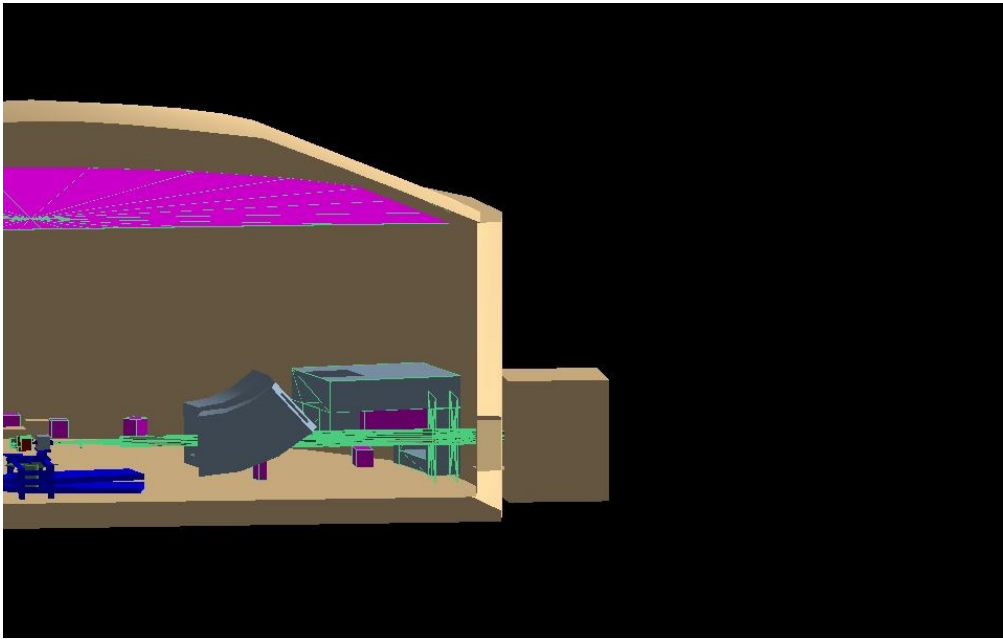


PREX geant Dump Results

Adam Zec

Presented at 2017-12-11 Group Meeting

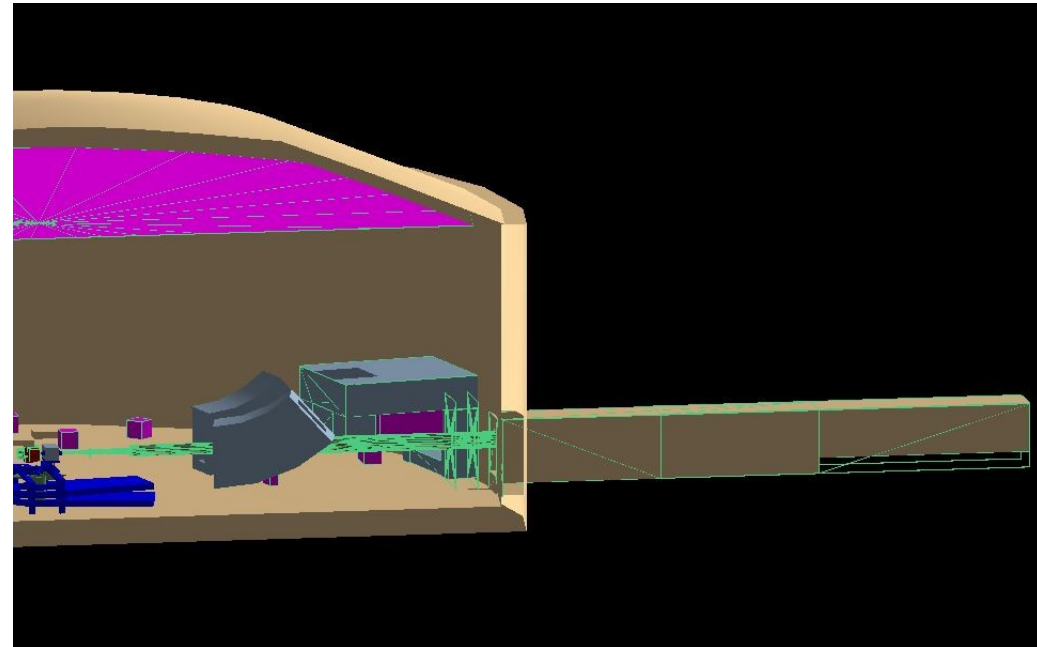
Dump Configurations



“shortDump”

Features:

- Hollow at the downstream end
- Ends at $z=3400$ cm

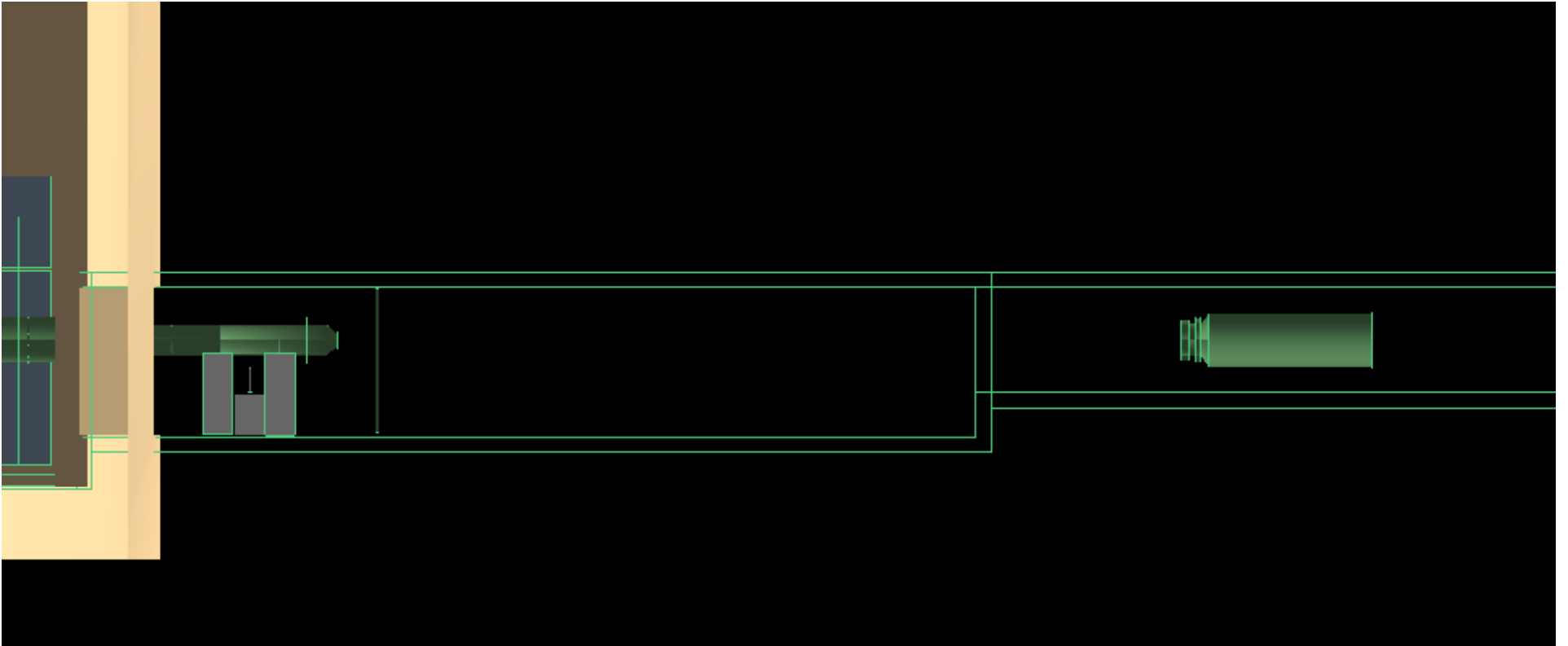


“extendedDump”

Features:

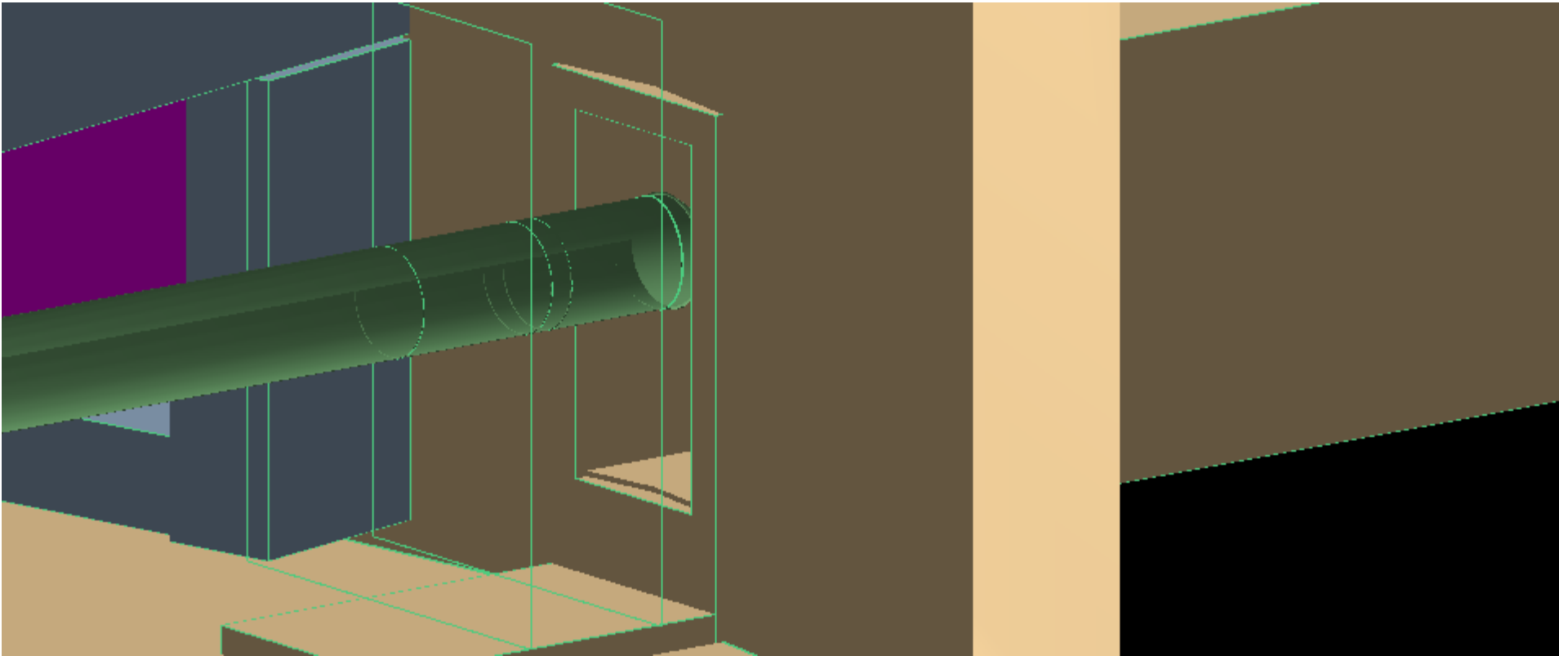
- Solid at end
- Has water tank (no beam in sim pipe past Al door!)
- Extended to $z=5200$ cm

Extended Dump Features



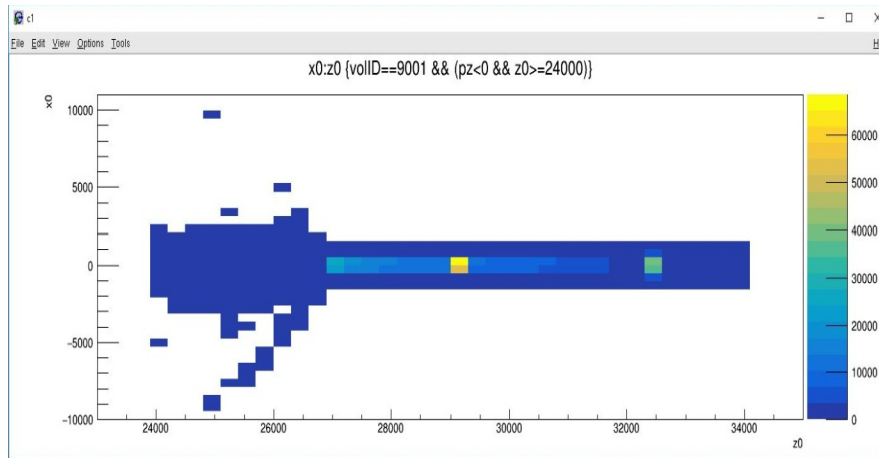
Water tank shape in the extended dump

Extended Dump Features

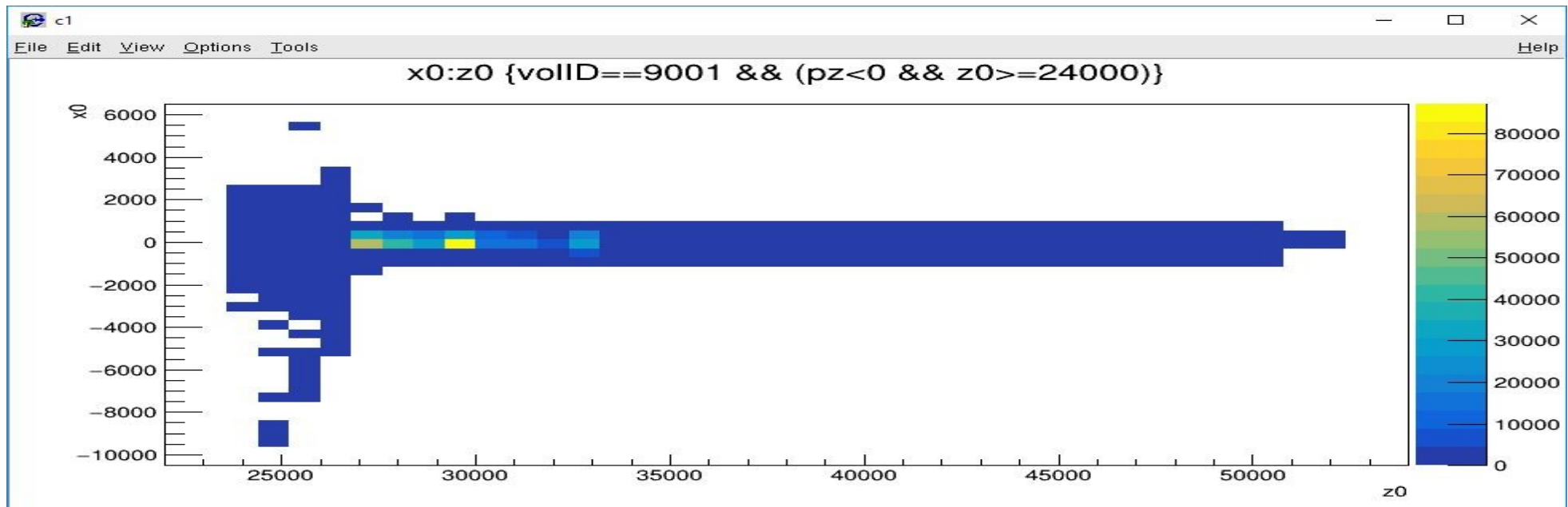


- Extended Dump entrance from hall

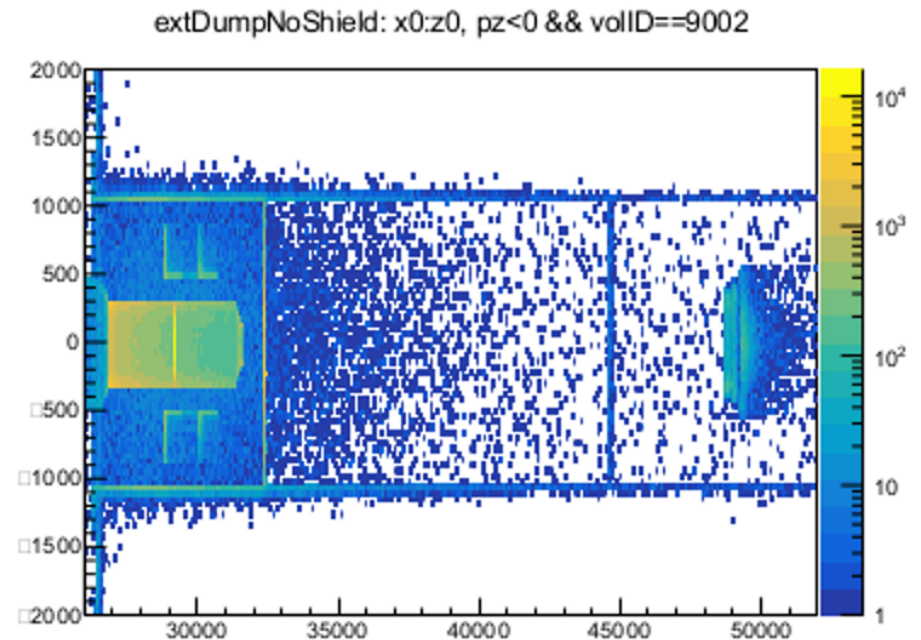
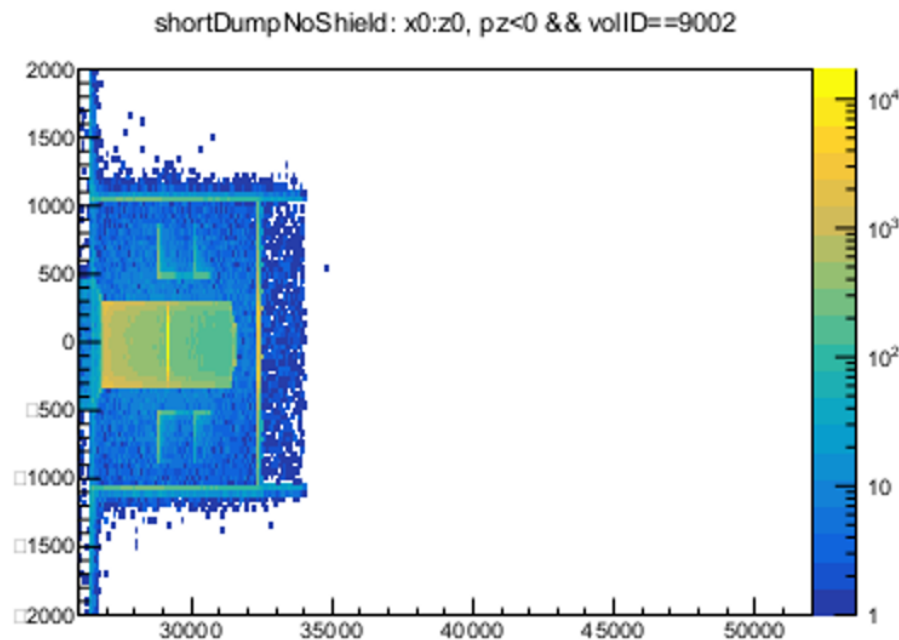
First Look



- Top: shortDump, Bottom: extDump
- of hits leaving dump are from upstream end
- Most events originating from beampipe neck-down and AI door

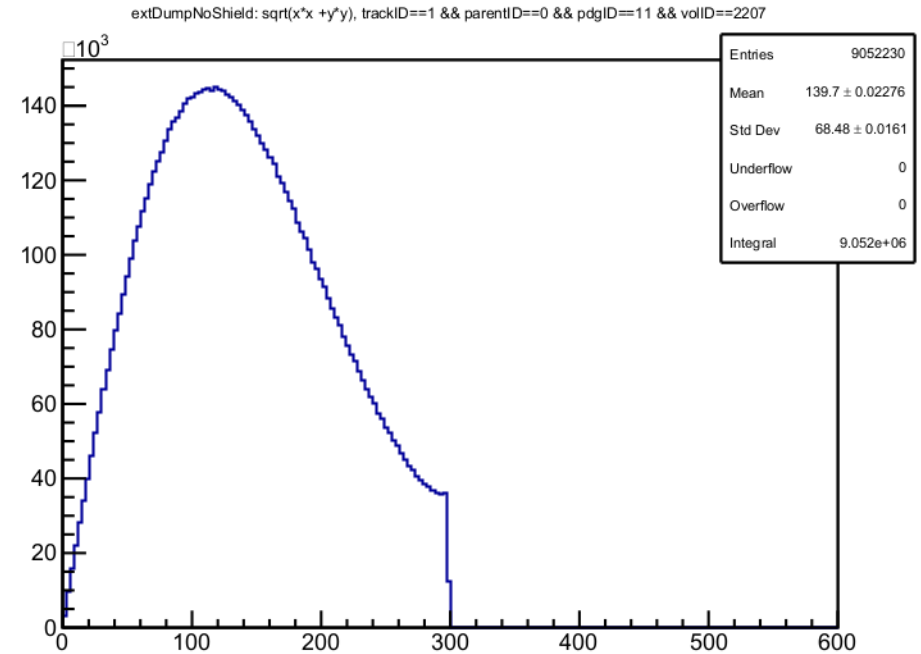
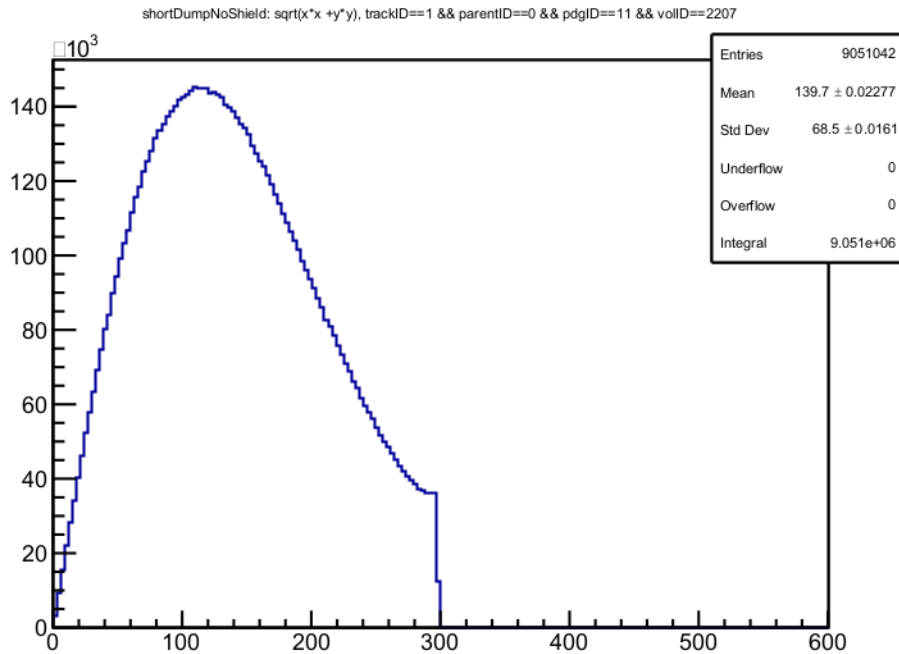


Closer Look



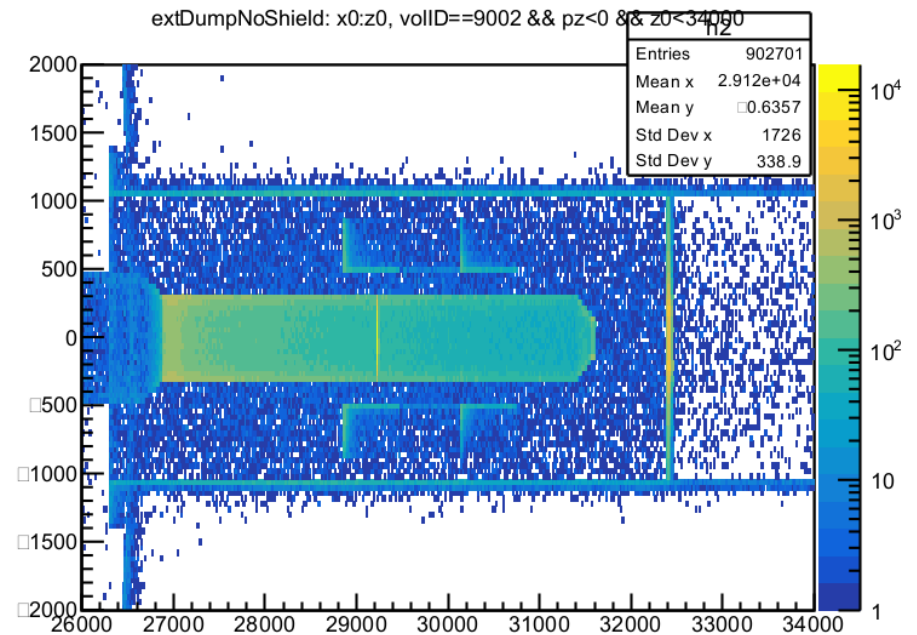
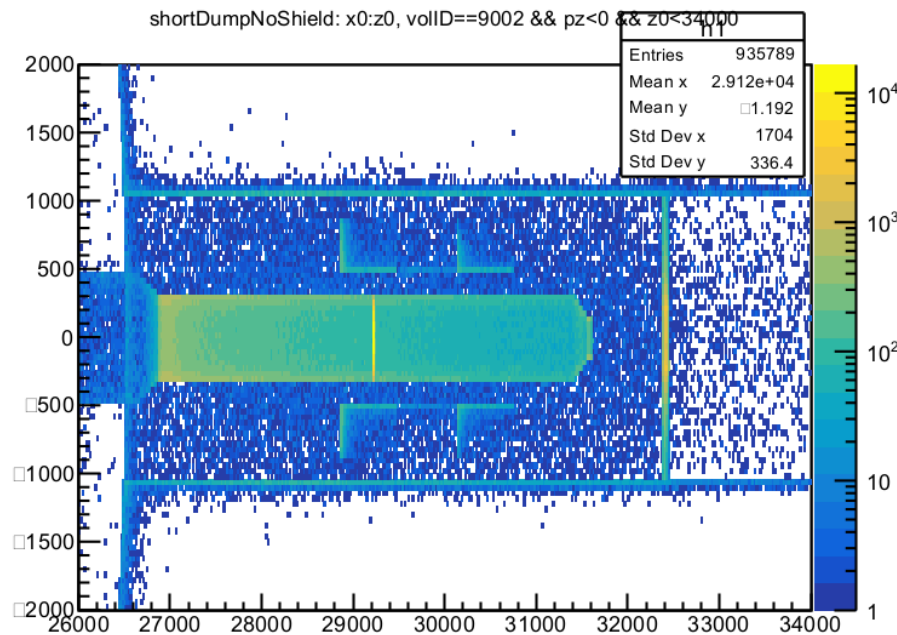
- Upstream results appear similar
- No energy cut here, events mostly dominated by low-energy photons
- Validation check: is incoming beam the same in both sims?

Validation



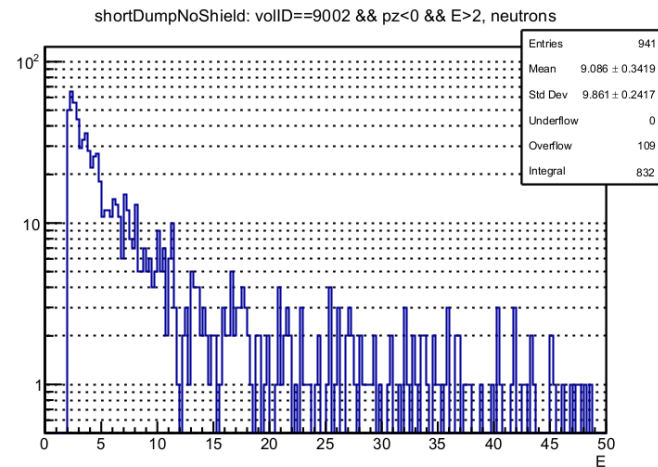
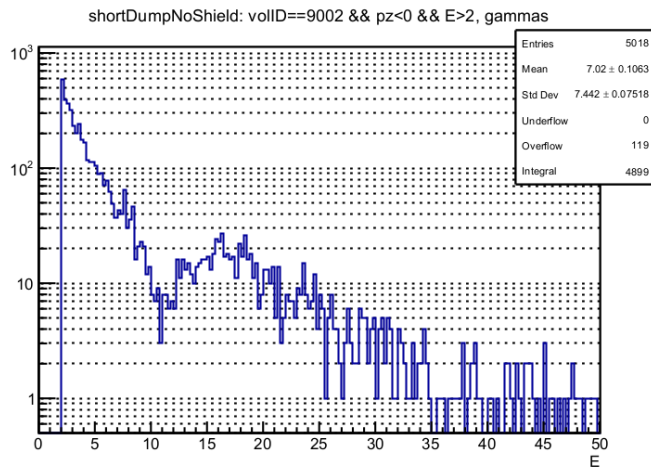
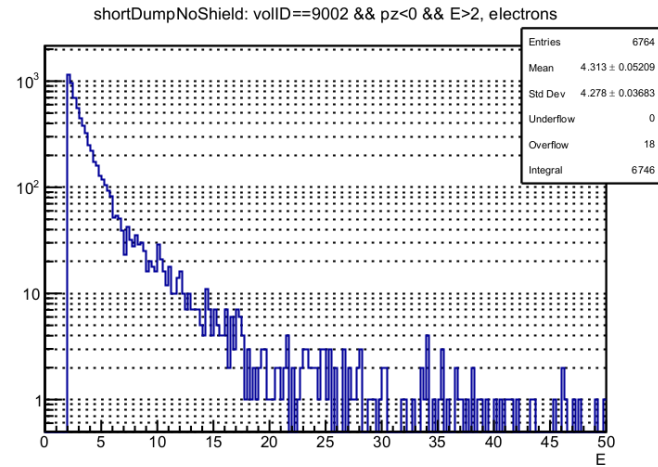
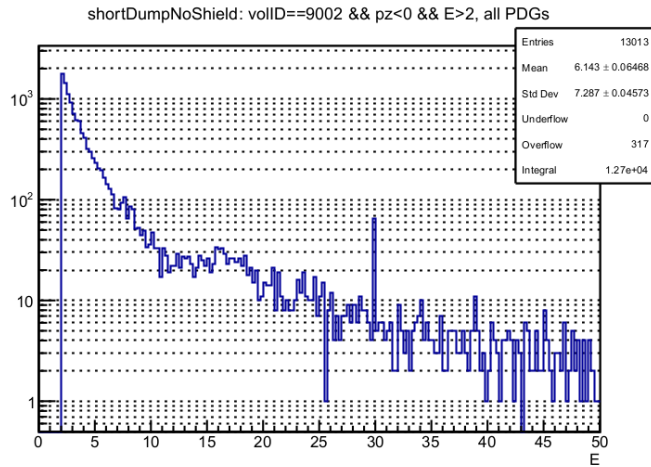
- From beamline detector, just upstream of dump entrance
- Difference in incoming beam events ~0.01%

Validation



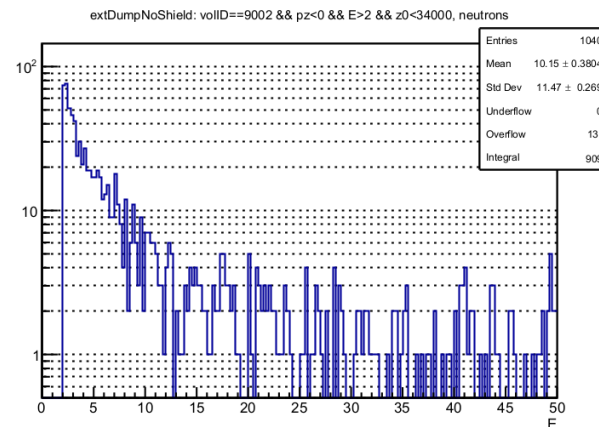
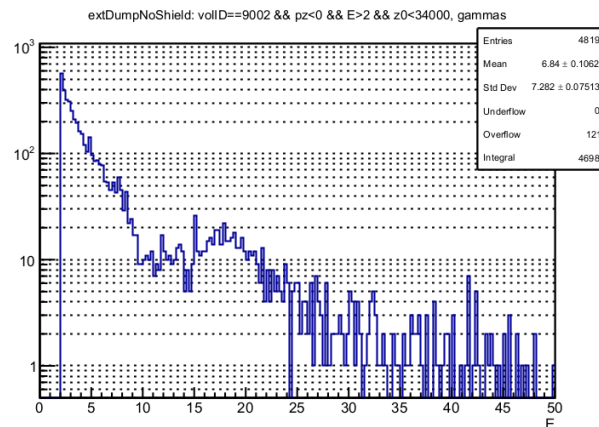
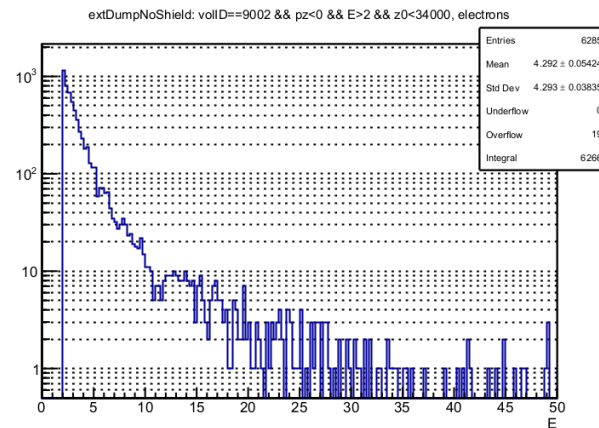
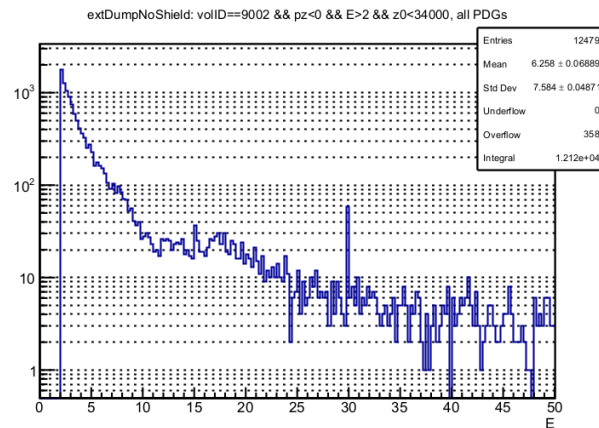
- Second test: by cutting off extDump at shortdump limit, do we get the same results?
- No energy cut applied, again events dominated by low energy photons
- Flux leaving dump now differs by 3.5% (within geant variance?)

shortDump Spectrum



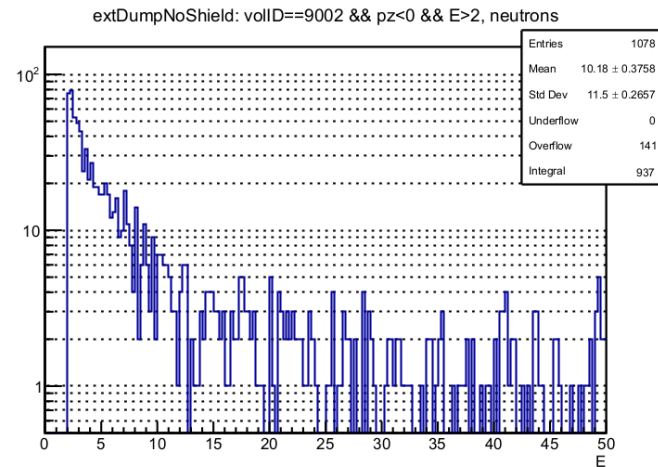
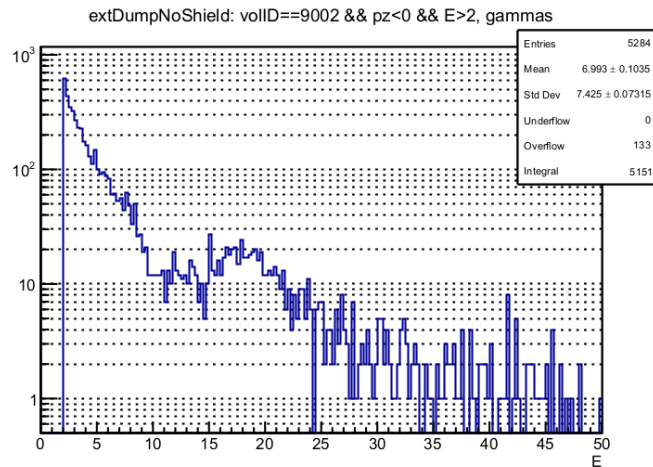
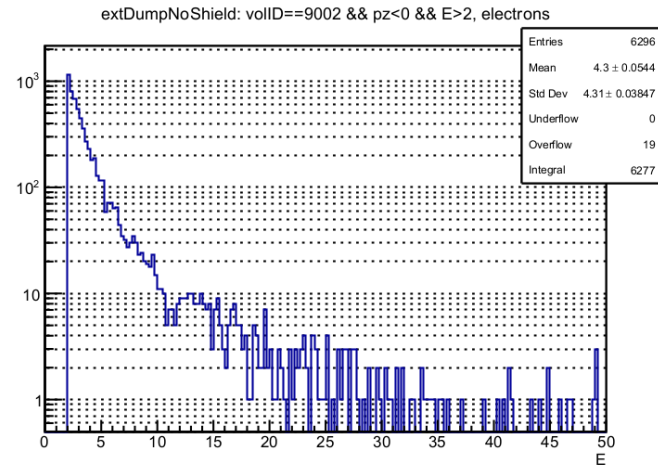
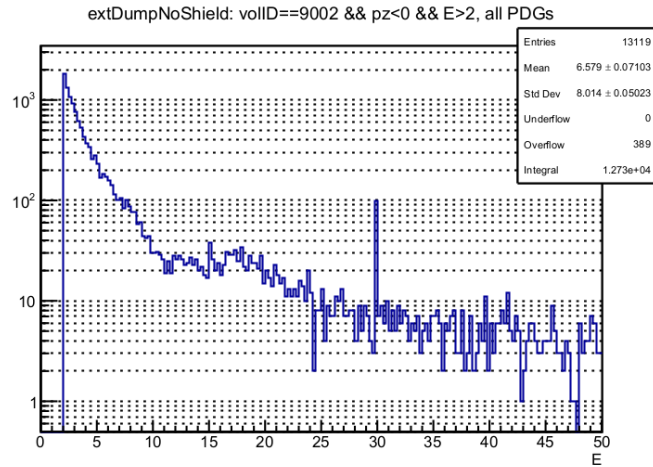
- Only counting events >2 MeV

ExtDump Spectrum WITH shortDump cut

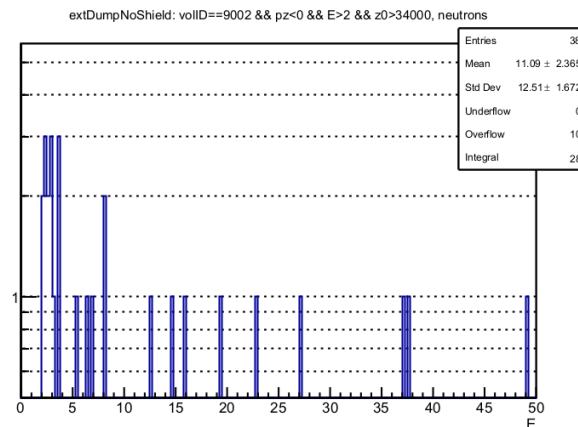
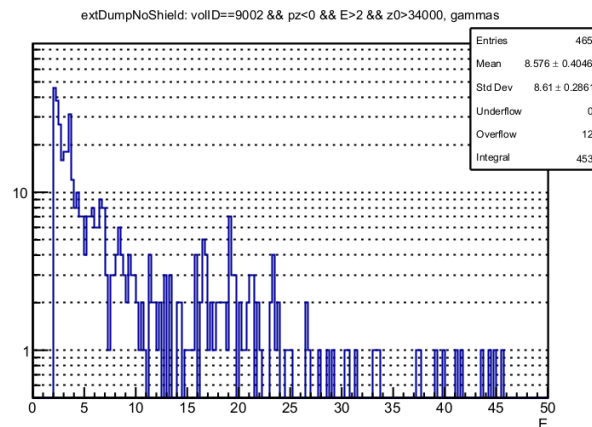
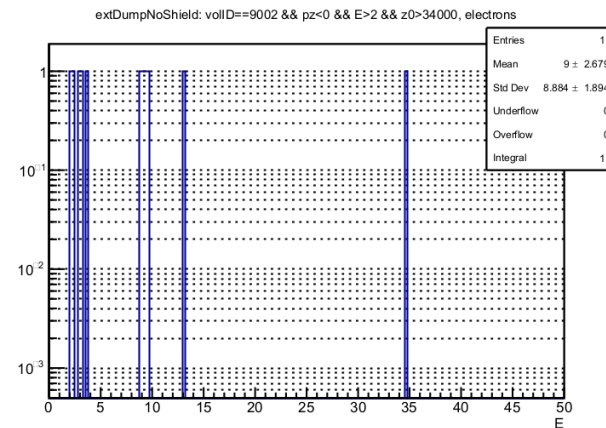
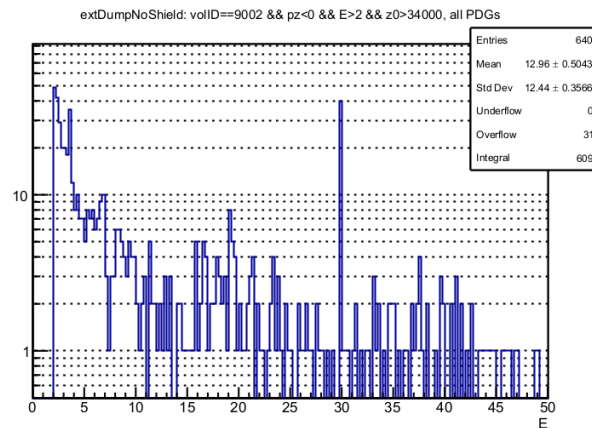


- All species: 4% difference in events, 3% difference in mean energy
- Neutrons: 10.5% diff events, 10.5% diff mean energy

extDump Spectrum



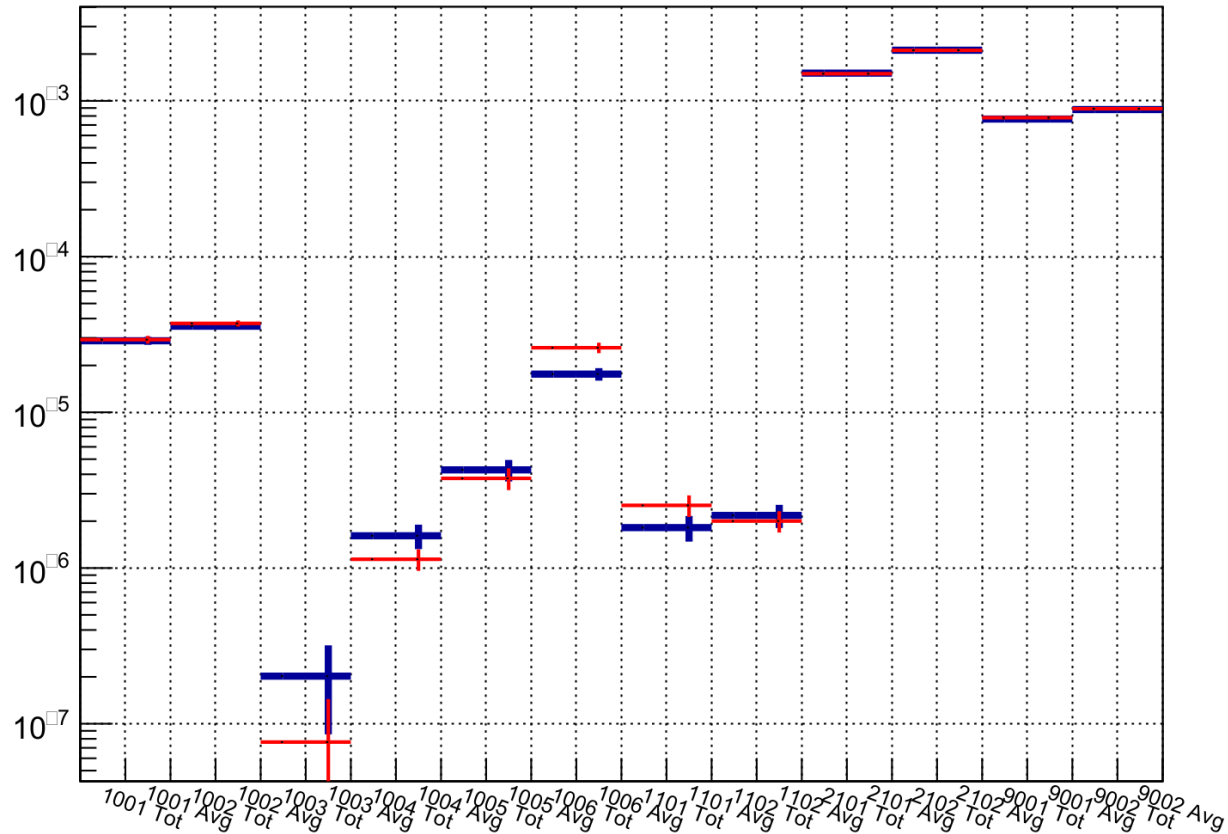
Events Coming from dwnstrm of AI door only



- All events: 4% of flux, 8% of total energy
- Electrons: 0.1% flux, 0.2% total energy
- Gammas: 9% flux, 11% total energy
- Neutrons: 3.5% flux, 3.9% total energy

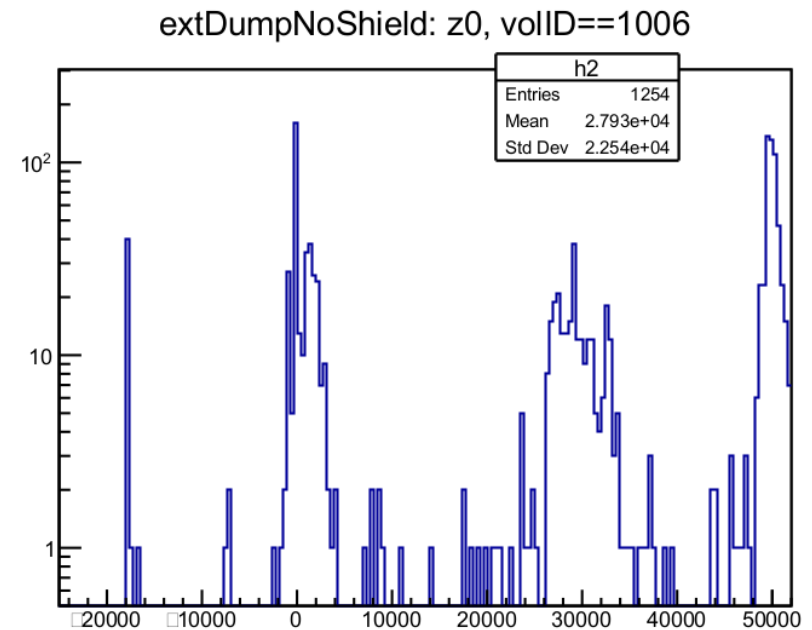
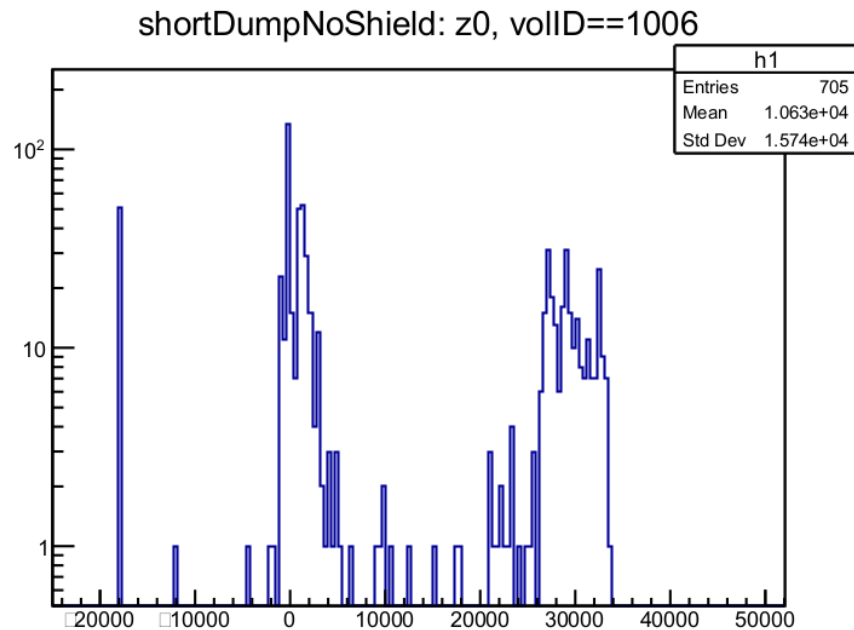
NEIL Comparison

summary histogram per electron on target| neilLogX



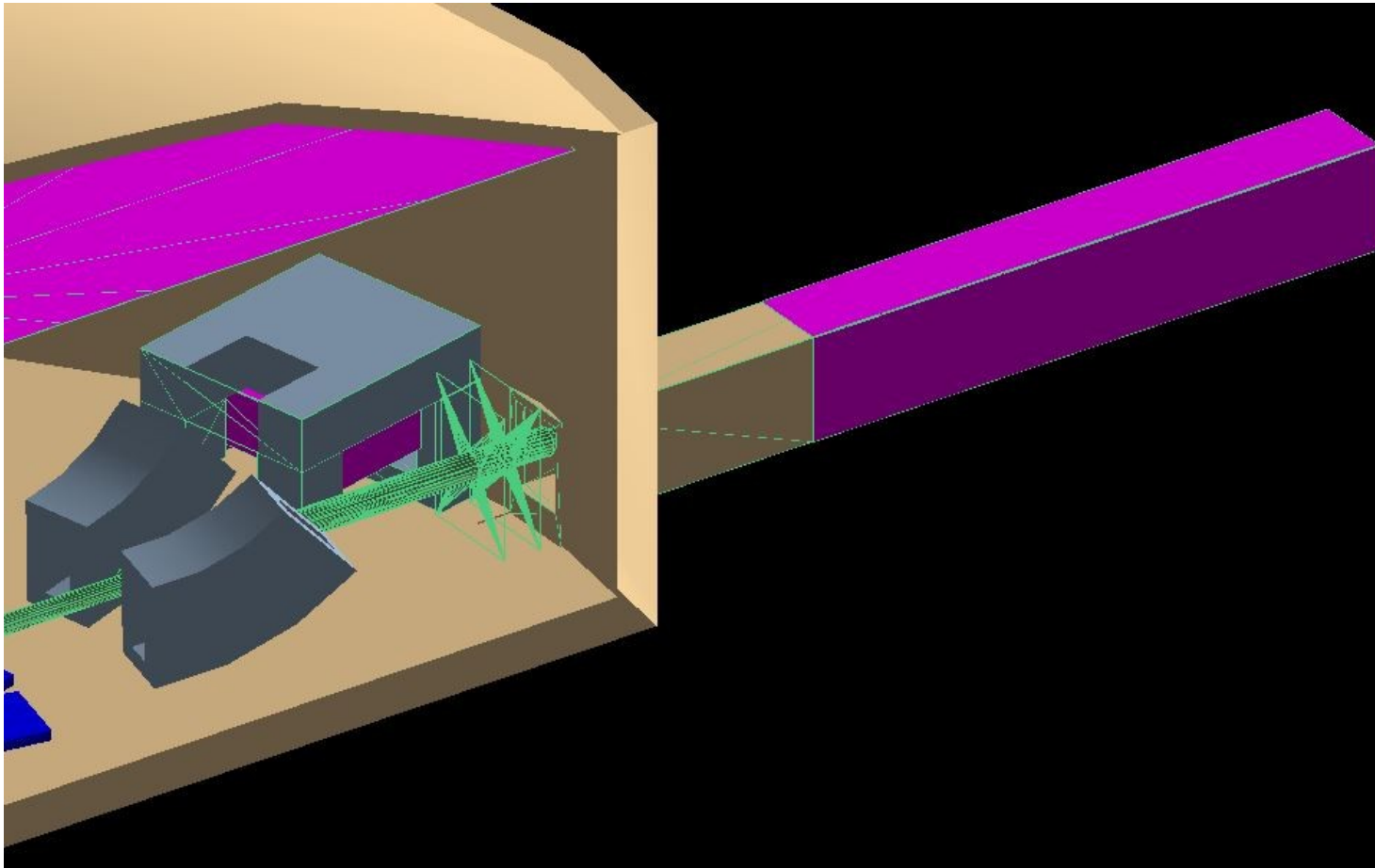
- Blue=shortDump, Red=extDump
- HRS unaffected by dump change
- Higher NEIL on hall lid... why?

Events on Hall Lid



- Hall lid experiences considerable neutron splashback from water tank
- Not reflective of reality!

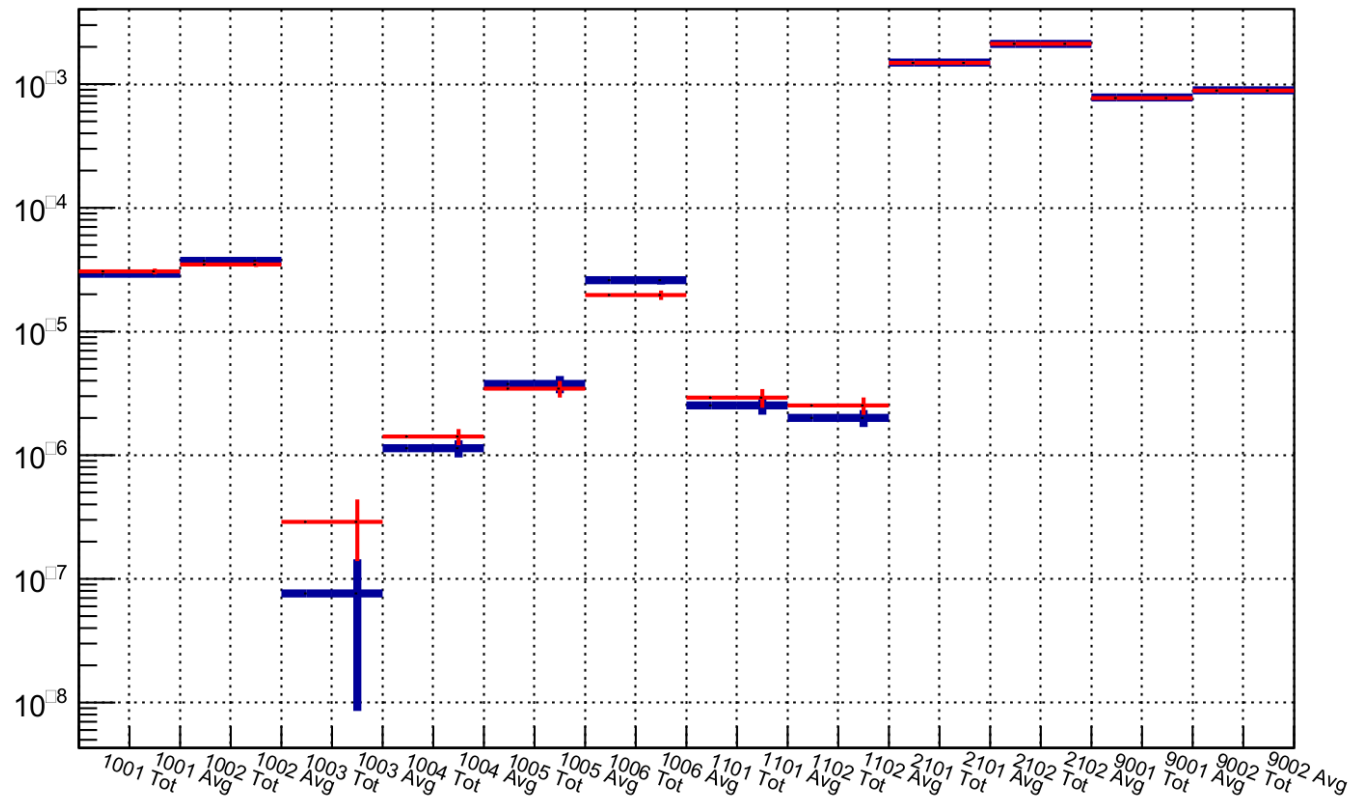
Dump with Outer Shielding



- Added kryptonite shield around downstream end of dump
- Represents considerable amount of concrete and earth between hall lid and end of dump

With Krip Shield

summary histogram per electron on target| neilLogX



- Blue = extended dump w/o shield, Red = extended dump with
- Radiation from hall lid down again

Conclusions

- Radiation from the far end of the dump hitting the HRS is negligible overall
- Majority of events scattered back from dump water tank region are gammas
- Possible follow up:
 - Overflows in some of the energy spectra... take a closer look at those?
 - Add beam pipe in majority of extended dump