

Chroma Simulation

Sebastian_08.01.2023(liquefaction)_correctedSiPM

8Silicon-NOREFLECTOR

July 23, 2024

Pocar Lab
Lab 21
nEXO Collaboration

1) Experiment Details

- Experiment Name: Sebastian_08.01.2023(liquefaction)_correctedSiPM
- Number of Particles: 500000
- Random Seed: 1042
- Excluded Geometry: ['reflector2', 'reflector3', 'reflector4', 'reflector5', 'reflector6', 'reflector7', 'reflector8', 'reflector9']
- PTE: $0.001368 \pm 5.2e-05$.

2) Material Properties

2.1) Bulk Materials

name	refractive_index	absorption_length	scattering_length	density
liquid xenon	1.69	3500000000000.0	350000000000000	2.9419999999999997
copper	0.9733	0.05	1000000	8.96
silicon	0.682	1000000.0	10000000	2.329
steel	1.29	100000000.0	1000000000	7.75
teflon	0.0	100000000.0	1000000000	7.75
silica	1.644000000000000	1100000000.0	1000000000	2.202
aluminum	0.09216	1000000.0	10000000	2.7
killing material	1.0	100000000.0	1000000000	0.0

name	abs(r_i_error)	eta	k	abs(eta_error)	abs(k_error)
liquid xenon	0.0	0.0	0.0	0	0
copper	0.0	0.972	1.5004	0	0
silicon	0.0	0.8398700000000001	1.9019	0	0
steel	0.0	0.0	0.0	0	0
teflon	0.0	0.0	0.0	0	0
silica	0.0	0.0	0.0	0	0
aluminum	0.0	0.09216	1.9217	0	0
killing material	0.0	0.0	0.0	0	0

2.2) Surface Properties

name	outer_mat	inner_mat	model_id	reflect_specular	reflect_diffuse
FBK HD3	liquid xenon	silicon	5	0	0
Cu-Xe	liquid xenon	copper	8	0	1
silicon-Xe	liquid xenon	silicon	4	1	0
killing surface	None	None	8	0	0

3) Results

3.1) Photon Transmission Efficiency

The Photon Transmission Efficiency (PTE) for this experiment was $0.001368 \pm 5.2\text{e-}05$.

3.2) Tallies

Tally	Count
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4) Plots

Detected Photon Tracks, Seed 1042, Run 1

Detected Photon Tracks, Seed 1042, Run 1

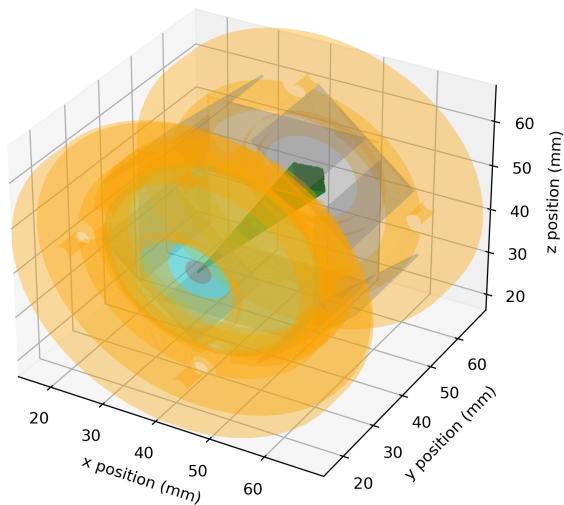


Figure 1: detected photon tracks, seed 1042, run 1
seed 1042 run 1

Reflected Photon Tracks, Seed 1042, Run 1

Reflected Photon Tracks, Seed 1042, Run 1

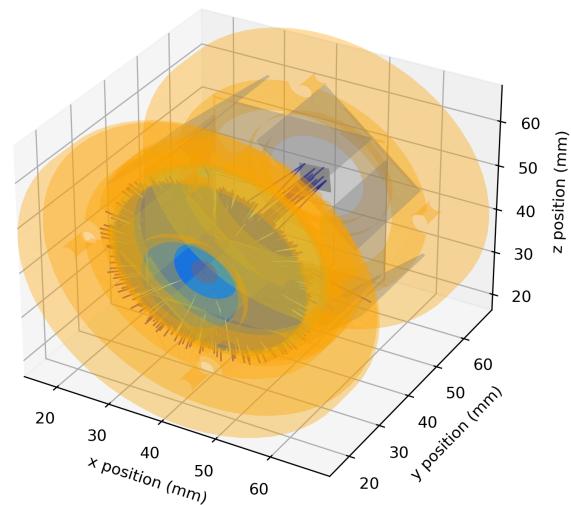


Figure 2: reflected photon tracks, seed 1042, run 1
seed 1042 run 1

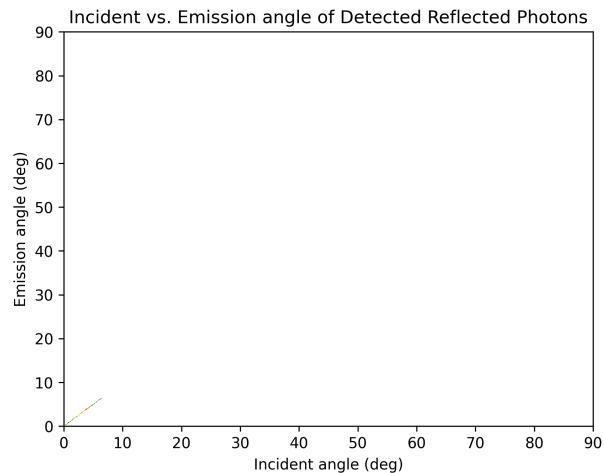


Figure 3: incident vs emission angle seed 1042

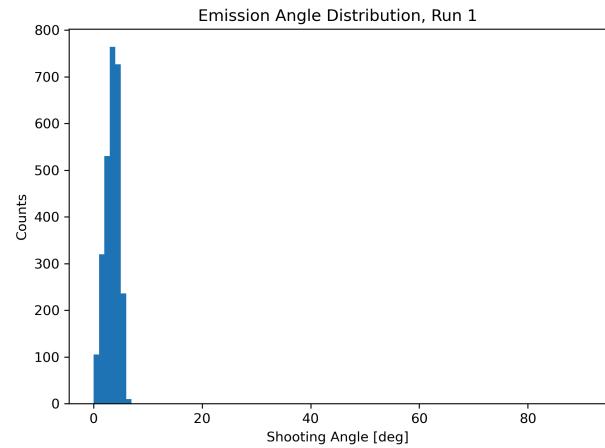


Figure 4: emission angle distribution seed 1042
run 1

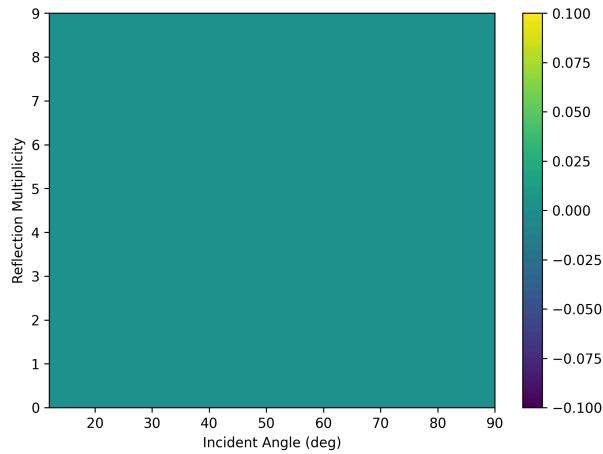


Figure 5: reflection angle distribution seed 1042

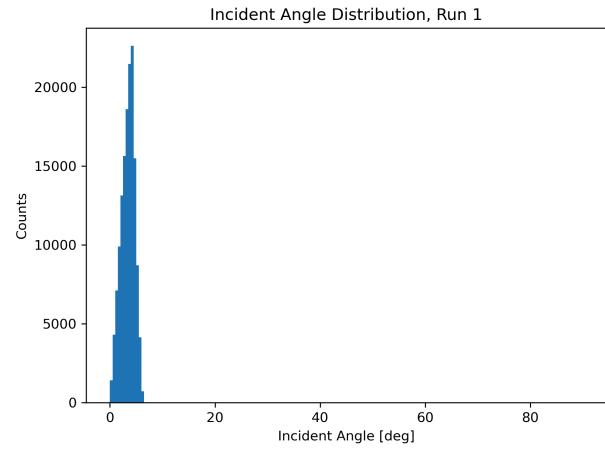


Figure 6: incident angle distribution seed 1042 run 1

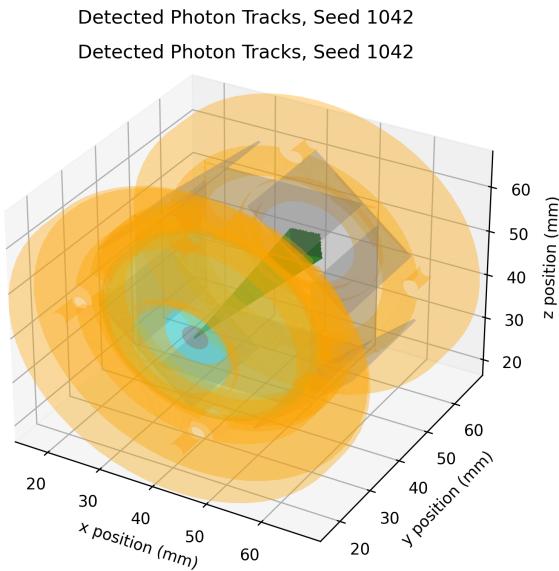


Figure 7: detected photon tracks, seed 1042 seed 1042

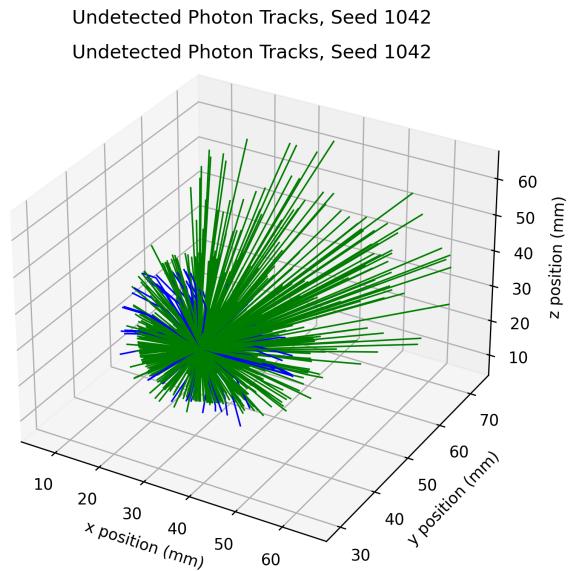


Figure 8: undetected photon tracks, seed 1042 seed 1042

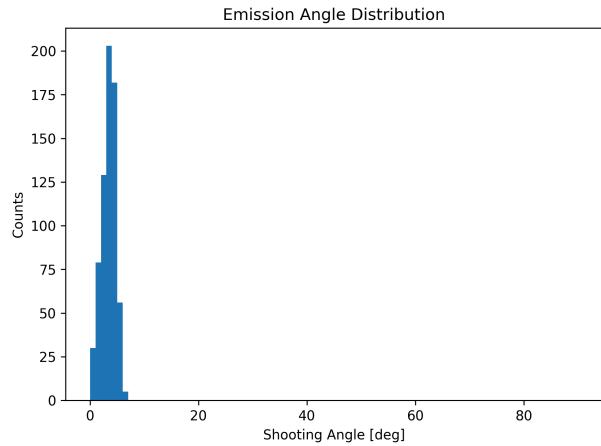


Figure 9: emission angle distribution seed 1042

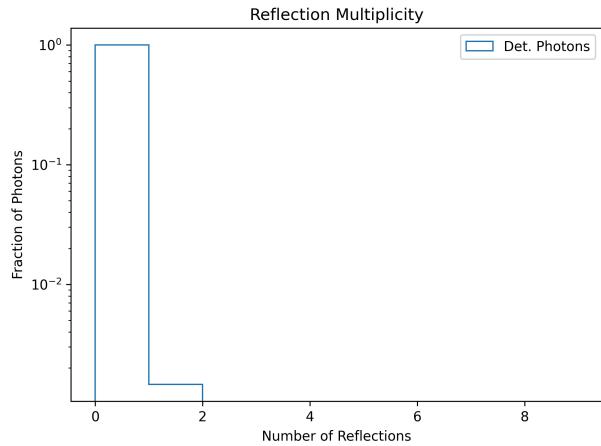


Figure 10: reflection multiplicity seed 1042

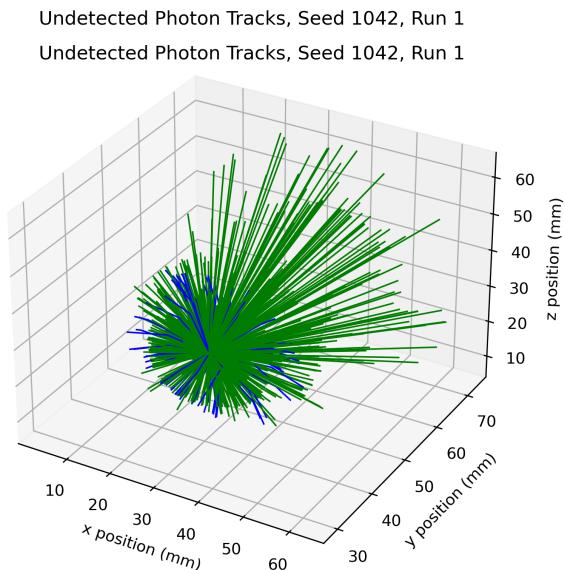


Figure 11: undetected photon tracks, seed 1042,
run 1 seed 1042 run 1

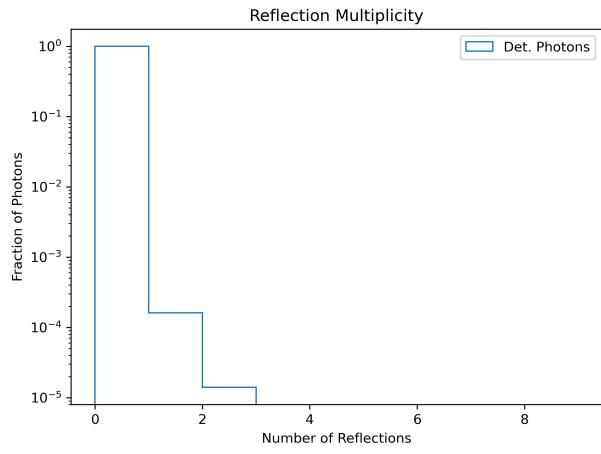


Figure 12: reflection multiplicity seed 1042 run 1

Specularly Reflected Photon Tracks, Seed 1042
Specularly Reflected Photon Tracks, Seed 1042

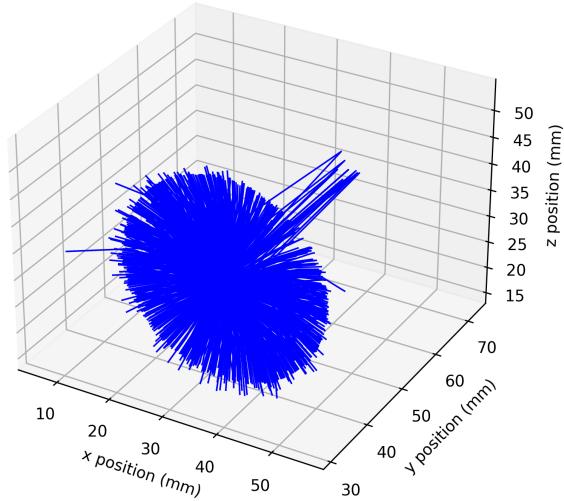


Figure 13: specularly reflected photon tracks, seed 1042 seed 1042

Filtered Scattered Photon Tracks, Seed 1042, Run 1
Filtered Scattered Photon Tracks, Seed 1042, Run 1

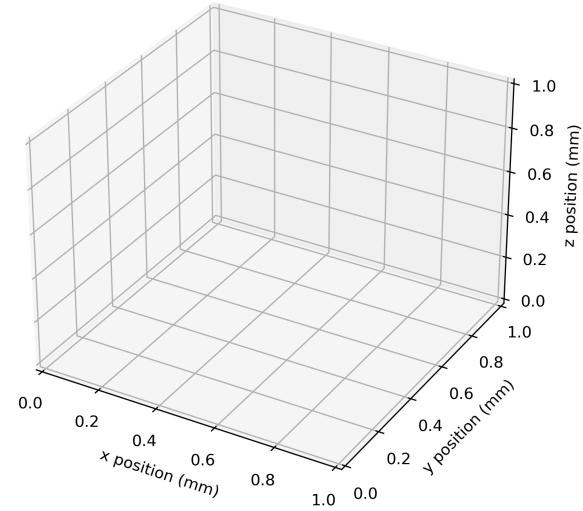


Figure 14: filtered scattered photon tracks, seed 1042, run 1 seed 1042, run 1

Filtered Scattered Photon Tracks, Seed 1042
Filtered Scattered Photon Tracks, Seed 1042

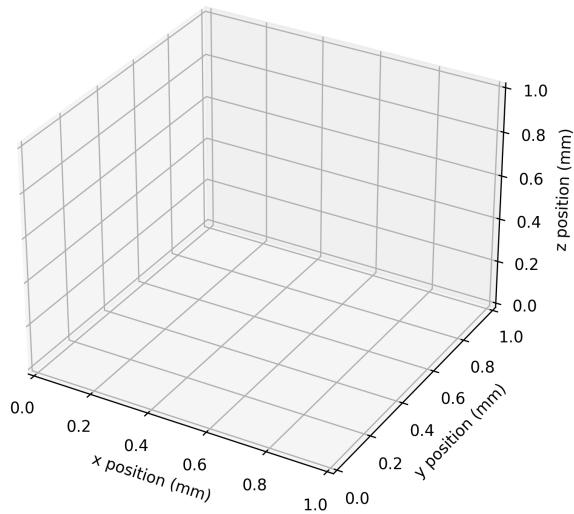


Figure 15: filtered scattered photon tracks, seed 1042 seed 1042

Diffusively Reflected Photon Tracks, Seed 1042, Run 1
Diffusively Reflected Photon Tracks, Seed 1042, Run 1

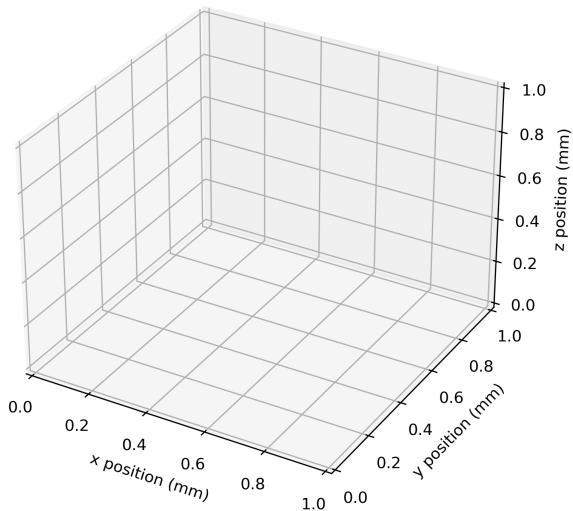


Figure 16: diffusively reflected photon tracks, seed 1042, run 1 seed 1042, run 1

Detected and Reflected Photon Tracks, Seed 1042, Run 1
 Detected and Reflected Photon Tracks, Seed 1042, Run 1

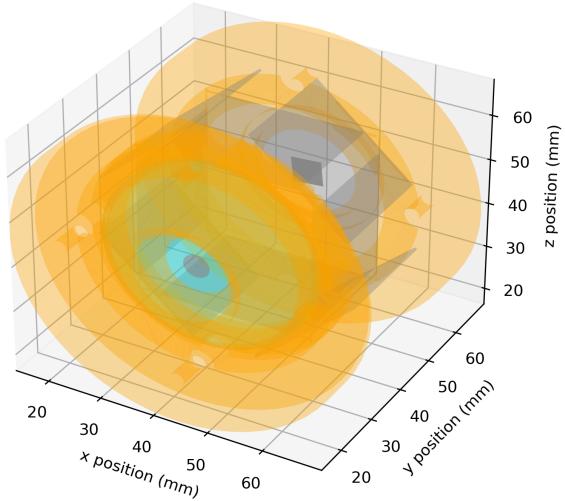


Figure 17: detected and reflected photon tracks, seed 1042, run 1 seed 1042 run 1

Specularly Refelcted Photon Tracks, Seed 1042, Run 1
 Specularly Refelcted Photon Tracks, Seed 1042, Run 1

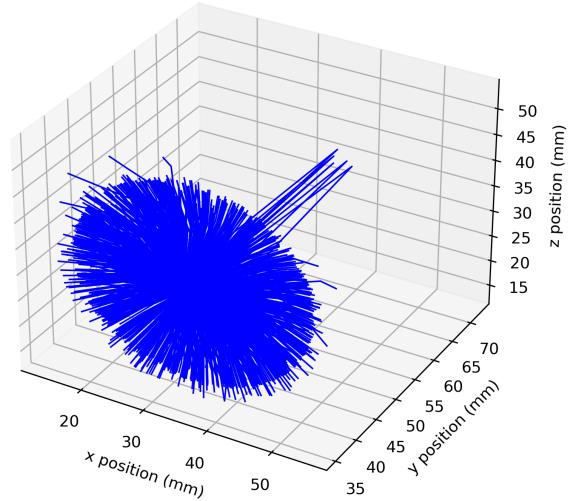


Figure 18: specularly refelcted photon tracks, seed 1042, run 1 seed 1042 run 1

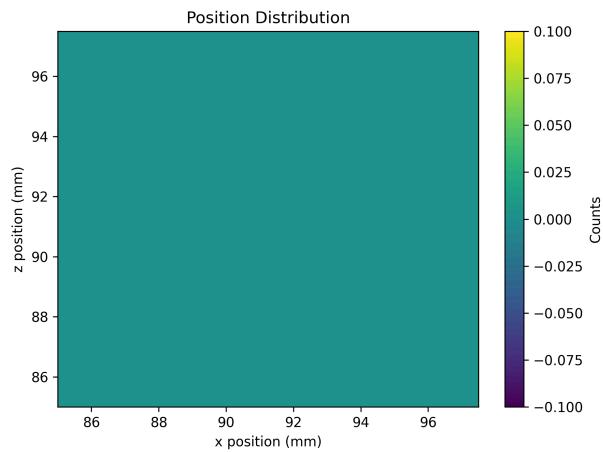


Figure 19: position distribution seed 1042

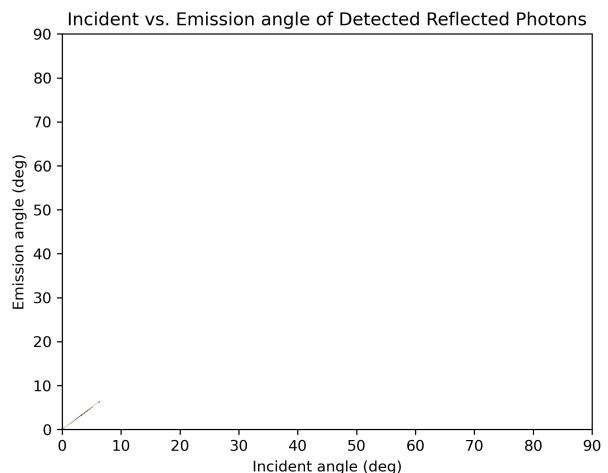


Figure 20: incident vs emission angle seed 1042 run 1

Diffusively Reflected Photon Tracks, Seed 1042
Diffusively Reflected Photon Tracks, Seed 1042

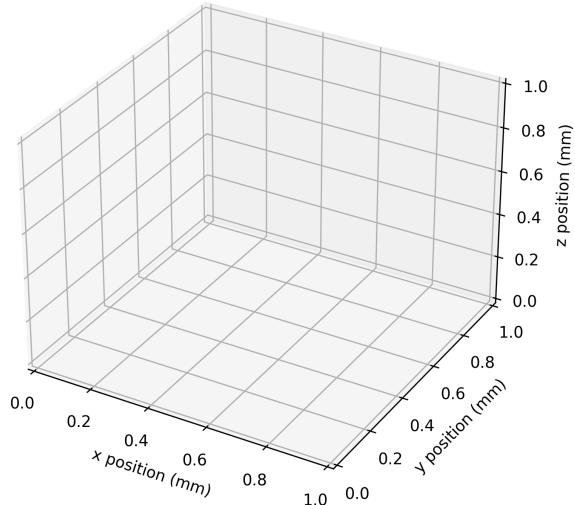


Figure 21: diffusively reflected photon tracks, seed 1042 seed 1042

Detected and Reflected Photon Tracks, Seed 1042
Detected and Reflected Photon Tracks, Seed 1042

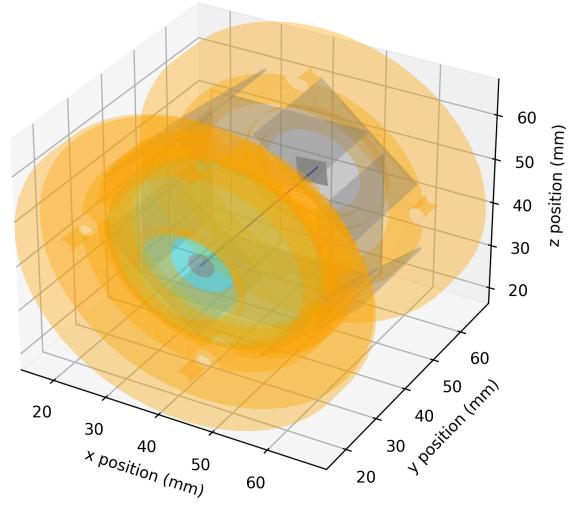


Figure 22: detected and reflected photon tracks, seed 1042 seed 1042

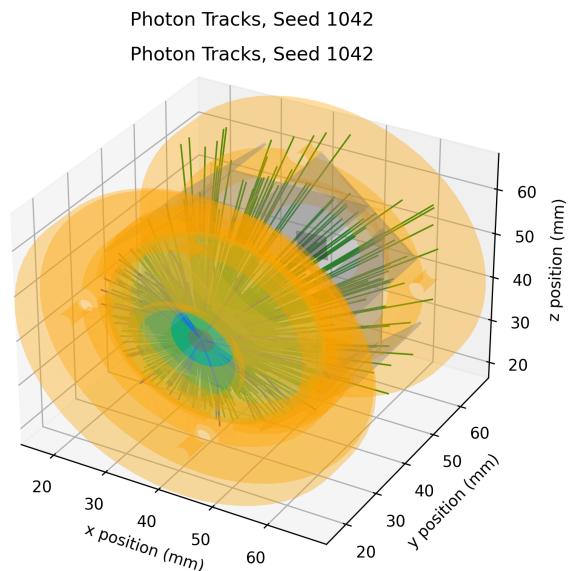


Figure 23: photon tracks, seed 1042 seed 1042

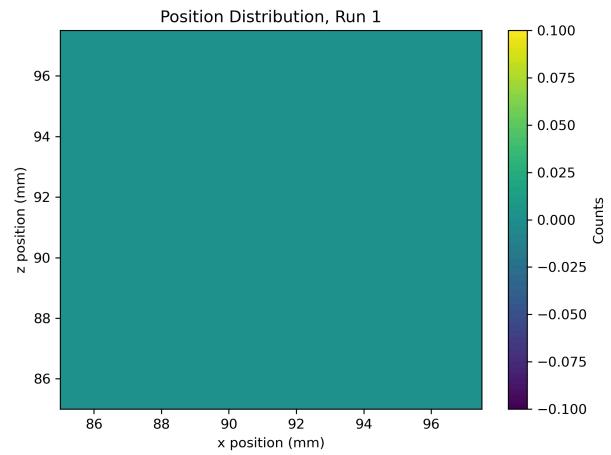


Figure 24: position distribution seed 1042 run 1

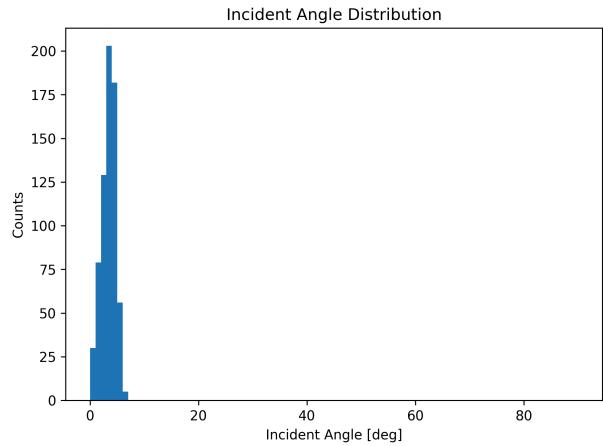


Figure 25: incident angle distribution seed 1042

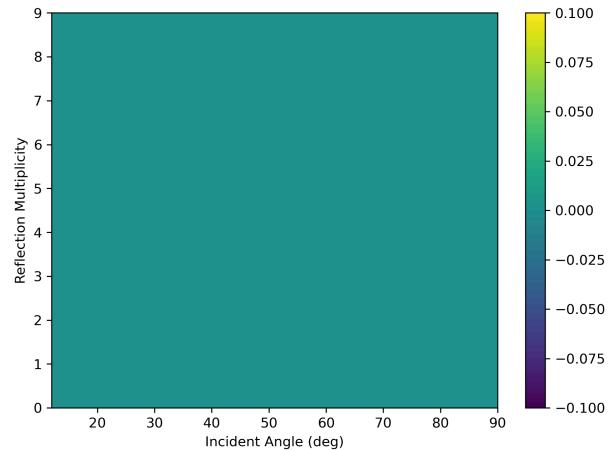


Figure 26: reflection angle distribution seed 1042
run 1

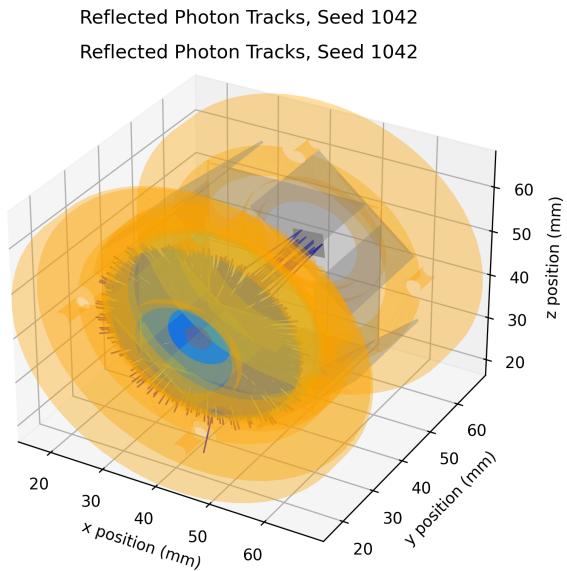


Figure 27: reflected photon tracks, seed 1042
seed 1042

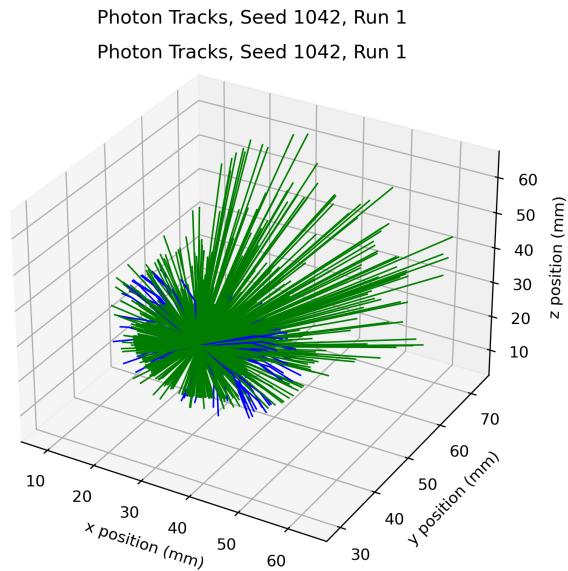


Figure 28: photon tracks, seed 1042, run 1 seed
1042 run 1