

Chroma Simulation

8refelctortall

silicon-noreflector-tall

July 23, 2024

Pocar Lab
Lab 21
nEXO Collaboration

1) Experiment Details

- Experiment Name: 8refelctortall
- Number of Particles: 1000000
- Random Seed: 1042
- Run ID: 1
- Excluded Geometry: ['reflector1', 'reflector3', 'reflector5', 'reflector7', 'reflector2', 'reflector4', 'reflector6', 'reflector8']
- PTE: 0.0013 ± 0.0000 .

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 0.0013 ± 0.0000 .

3.2) Tallies

Tally	Count
NO_HIT	426226
BULK_ABSORB	16
SURFACE_DETECT	1294
SURFACE_ABSORB	572464
REFLECT_DIFFUSE	0
REFLECT_SPECULAR	0

4) Plots

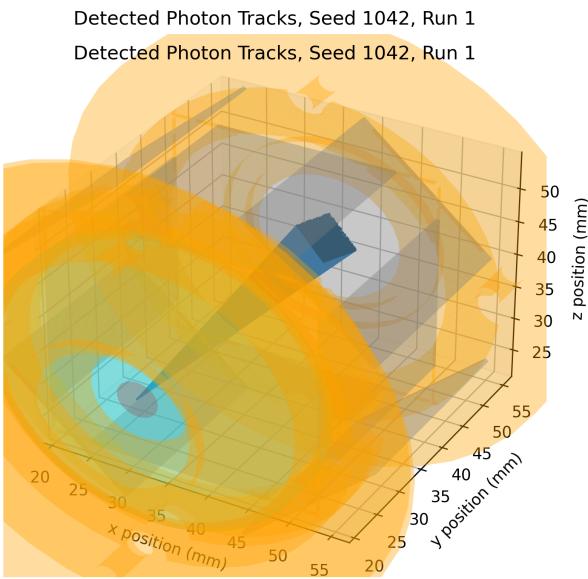


Figure 1: detected photon tracks, seed 1042, run 1 seed 1042 run 1

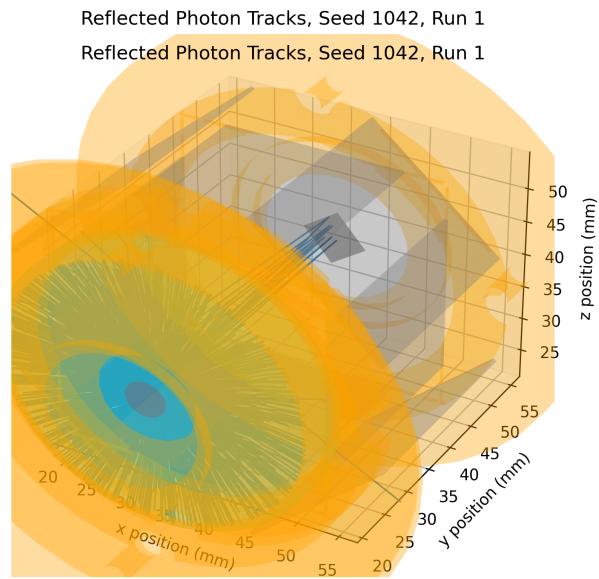


Figure 2: reflected photon tracks, seed 1042, run 1 seed 1042 run 1

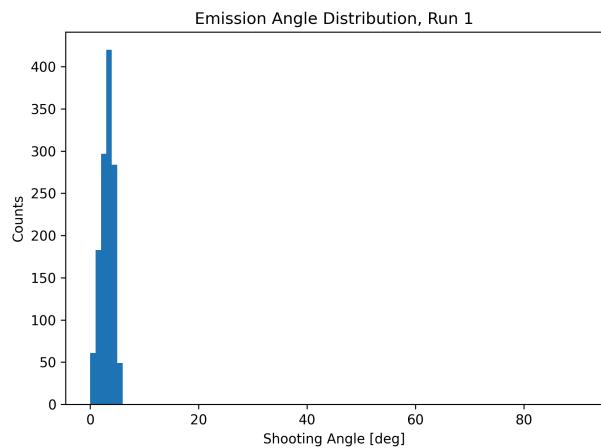


Figure 3: emission angle distribution seed 1042 run 1

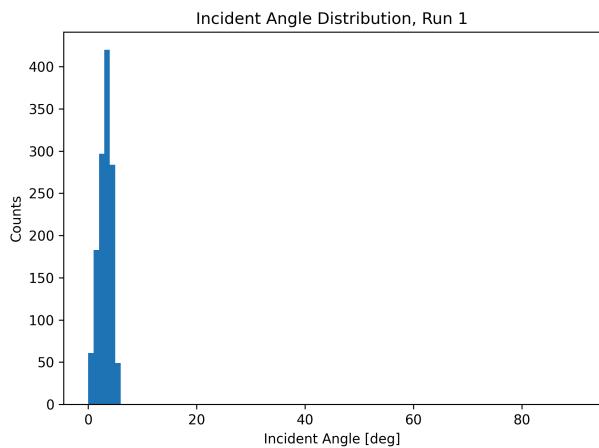


Figure 4: incident angle distribution seed 1042 run 1

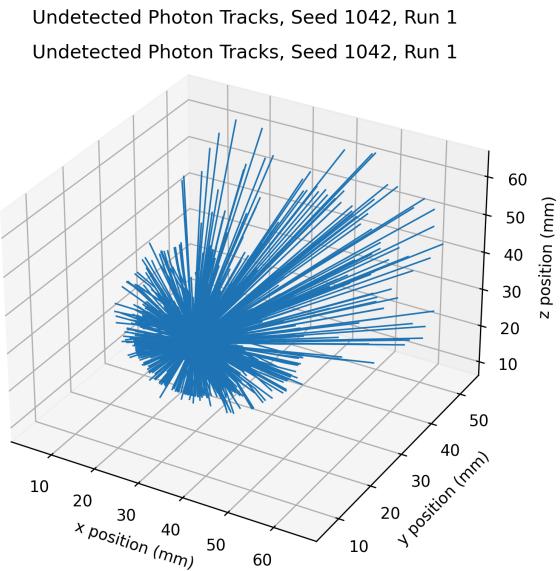


Figure 5: undetected photon tracks, seed 1042, run 1 seed 1042 run 1

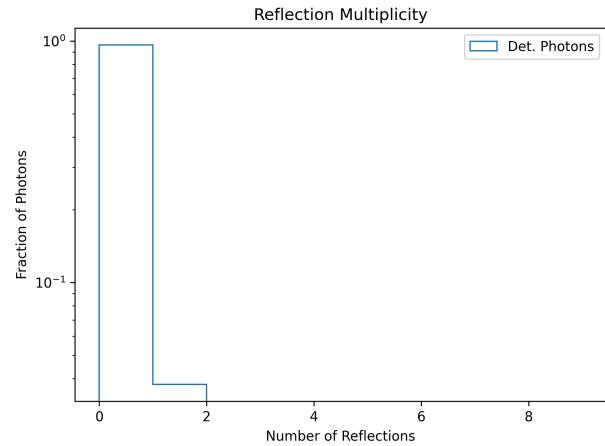


Figure 6: reflection multiplicity seed 1042 run 1

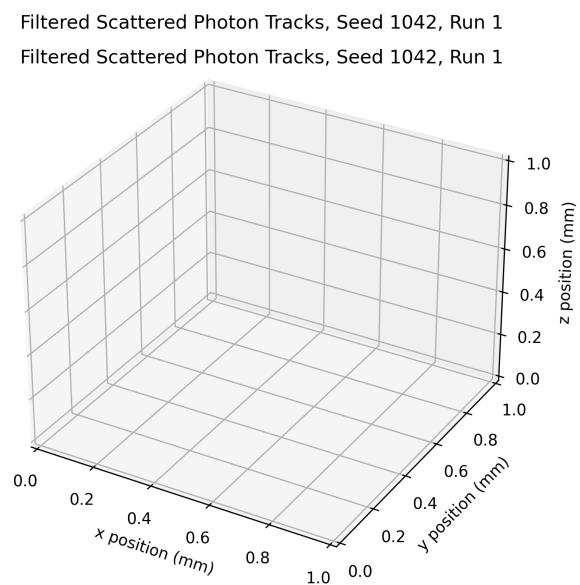


Figure 7: filtered scattered photon tracks, seed 1042, run 1 seed 1042 run 1

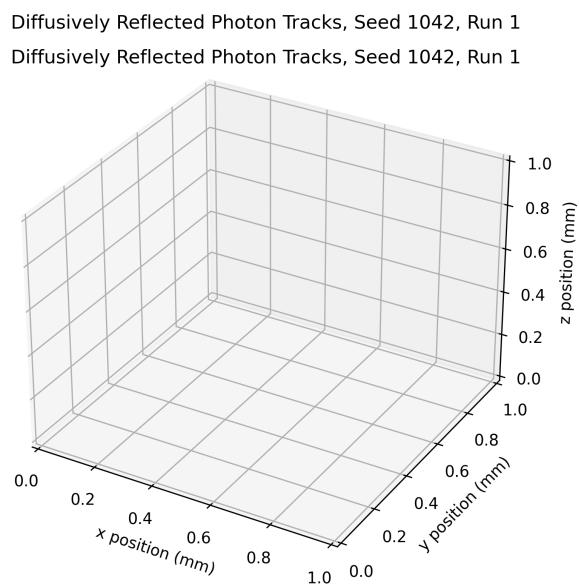


Figure 8: diffusively reflected photon tracks, seed 1042, run 1 seed 1042 run 1

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

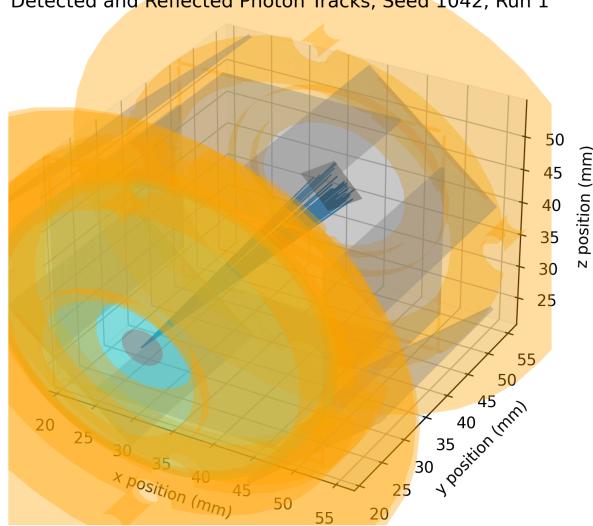


Figure 9: detected and reflected photon tracks,
 seed 1042, run 1 seed 1042 run 1

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

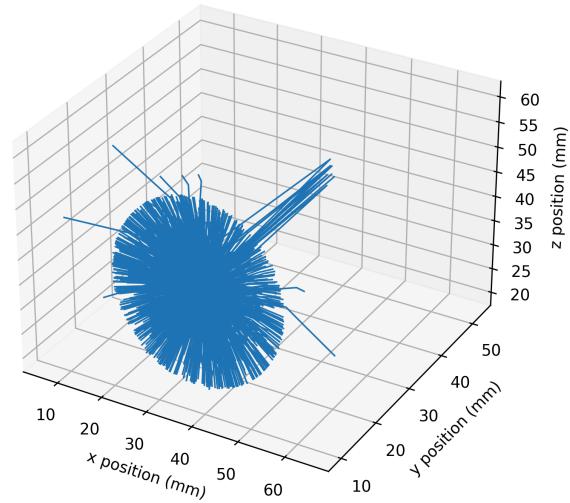


Figure 10: specularly reflected photon tracks,
 seed 1042, run 1 seed 1042 run 1

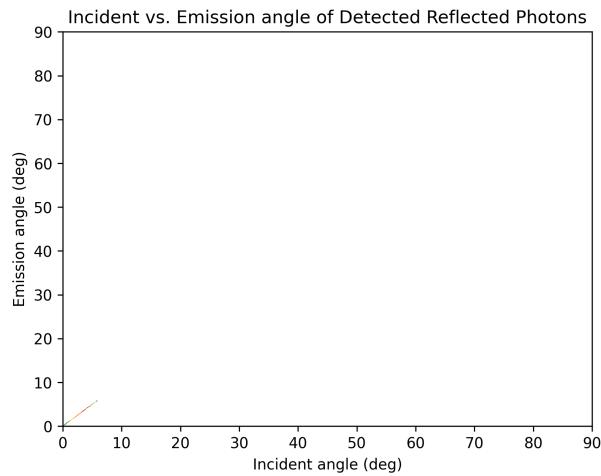


Figure 11: incident vs emission angle seed 1042
 run 1

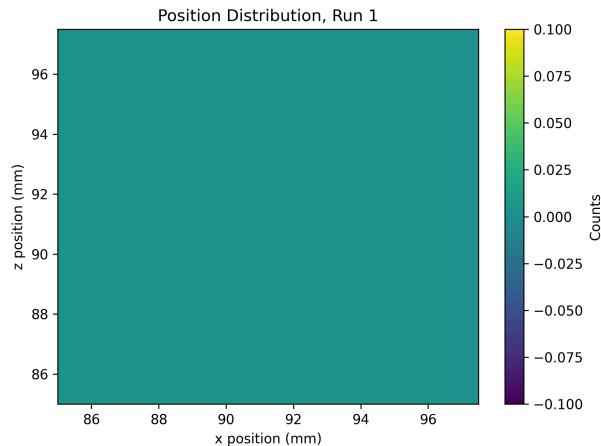


Figure 12: position distribution seed 1042 run 1

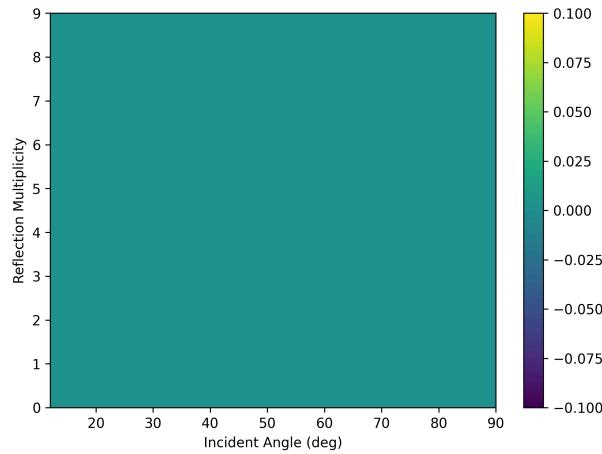


Figure 13: reflection angle distribution seed 1042
run 1

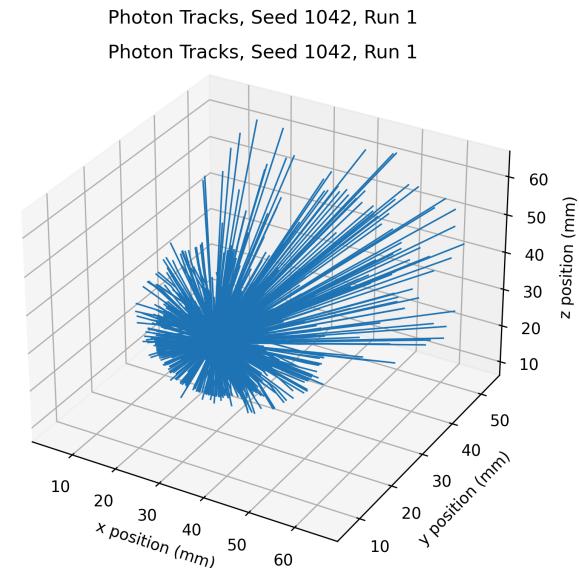


Figure 14: photon tracks, seed 1042, run 1 seed
1042 run 1