Brookhaven National Laboratory

U.S. DEPARTMENT OF ENERGY

CERN Beam Test 2026 Simulation

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To-do list

	Hardware measurements	Simulation update	Time scale
HRPPD	✓ QE uniformity ✓HRPPD 15, 16, 17 ✕ HRPPD 23 (at Incom), 27		
	✓ Gain uniformity analysis pipeline: Get scanning and analysis macros ready		
		✓ Implement updated QE(λ) in simulation using photocurrent from Chandra	By May 27th
Aerogel		✓Thickness ✓Absorption length ✓Refractive index	
UV filter		✓ Material definition (change from acrylic to borosilicate) ✓ Absorption length ✓ Refractive index Fixed issue with long processing time	
	✓ Remeasure absorption length		
Mirror		❑ Pyramid mirror geometry ❑ Conical mirror geometry ✓ Reflectivity	
Beam spread		❑ Option for beam spread angle ❑ Option for beam diameter	
Analysis macros		✓Hit maps ❑QA plots ❑HRPPD QE ❑UV filter transmittance ❑Mirror reflectivity	
Large scale simulation		✓ Read in events from hepMC files ✓ Options for particle species (π, K), and momentum ❑Run script, condor script (in progress) ❑Estimate statistics and the corresponding runtime	

Fixed Issue of Long Process Time

- Long Processing time due to not well-defined photon energy for refractive index/ absorption length initialization
  - Bad: double E[2]={1, 2};
  - Good: double E[2]={1*eV, 2*eV};
- Corrected photon energy initialization and enable Cherenkov photon generation inside the UV filter
- Processing time reduced from ~2.5min per particle to 0.02s per particle