HPDIRC PREPARATIONS TOWARDS TDR

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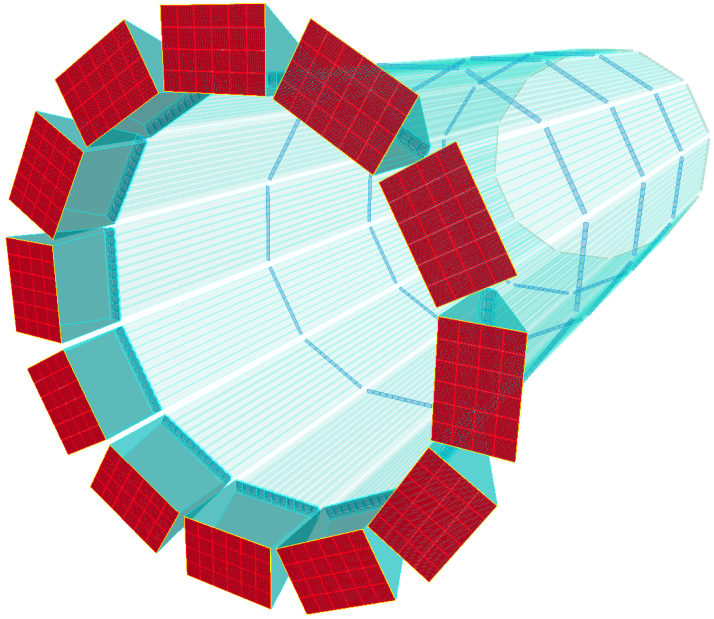
CUA



hpDIRC Annual Workshop in Jefferson Lab

- May 16th – 22nd (https://indico.bnl.gov/event/23332/)
- 11 participants in person, 7 participants online (some only for specific sessions)
- All sessions had focus on TDR readiness and overall hpDIRC/ePIC schedule
- Designated TDR sessions used to identify remaining studies, required figures, and write detailed plan
- Several days before and after the meeting were used to work on hpDIRC project planning, schedule, and updating P6 plan

Day	Date	Morning	Afternoon
Thursday	May 16	MCP-PMTs	Sensors SiPMs / TDR
Friday	May 17	Test Besam NIM paper	BaBar bar boxes / eRD103
Saturday	May 18	Simulation Studies	CRT / PicoSec / eRD103
Sunday	May 19	ePIC Simulation	TDR
Monday	May 20	Simulation Studies	BaBar bar boxes / eRD103
Tuesday	May 21	Mechanical Design	TDR
Wednesday	May 22	TDR	BaBar bar boxes / Project Planning

hpDIRC TDR Preparations

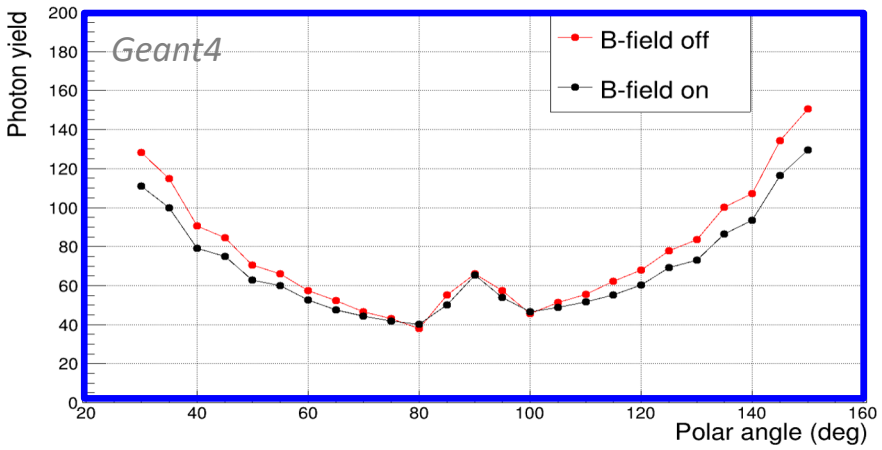
- hpDIRC TDR section outline prepared
  - Relevant needed figures identified
  - Some needed figures will be referenced (B field, radiation map, etc.), might include them in paper with ZOOM to hpDIRC region
  - Detailed breakdown of needed content – ready to write!
  - Remaining questions/studies identified and assigned
  - Performance plots will be updated for final geometry and are easy to adjust to uniformly agreed representation and style with other systems

Section	Subsecion	Content
Requirements/Motivation		
	Performance	
	Integration	
System Description		
	Concept	hpDIRC unique aspects
	Design	description of components, how the required performance (KPP) will be achieved
	Performance	description of simulation and reconstruction method, CERN validation
	Calibration	alignment - survey marks, experimental data for calibration
Implementation		
	Mechanical	Design and integration, Assembly of modules, Installation
	Services	nitrogen, cooling, voltage, controls and monitoring, laser calibration
	Other activities needed	
	QA	CRT (Full module), Readout (Sensors + Front-end Electronics), Bars/Mirrors (Laser Lab in JLab), Prisms (?), Lenses (ODU setup)
	Timeline, workforce, work packages	
	ES&H	
	Risk mitigation	Readout electronics, Sensor (Whatever is not tested)

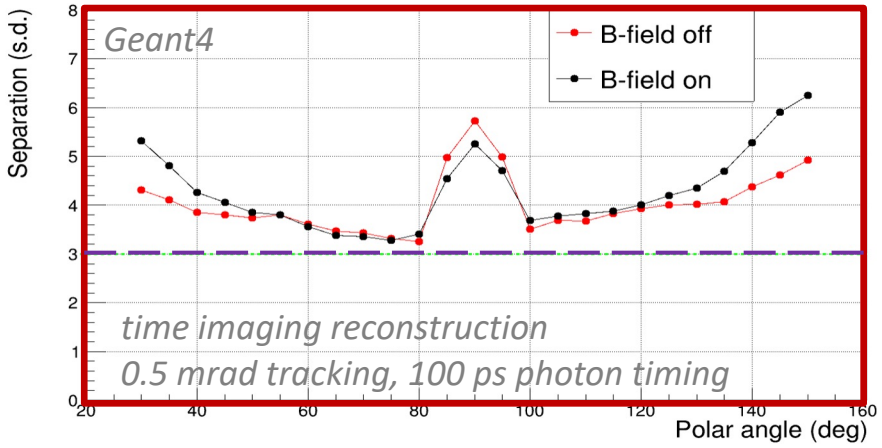
hpDIRC TDR Preparations

- Updates to hpDIRC previously done performance studies have no impact on performance, small impact on acceptance
- Studies of hpDIRC performance were done with test beam validated simulation
  - Realistic ePIC magnetic field map was used
  - Studies with Pythia physics events were done
  - Multiple tracks per event in single bar showed very small impact on performance
  - Most studies assumed 0.5 mrad angular tracking resolution but software ready to import and include detailed parametrization of tracking

Photon yield per particle



π/K separation power at 6 GeV/c

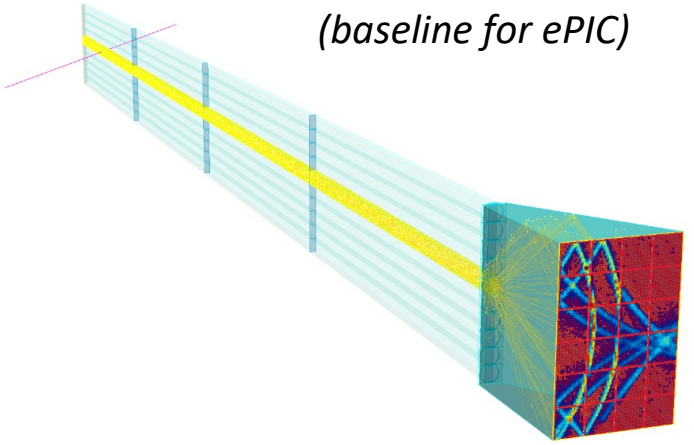


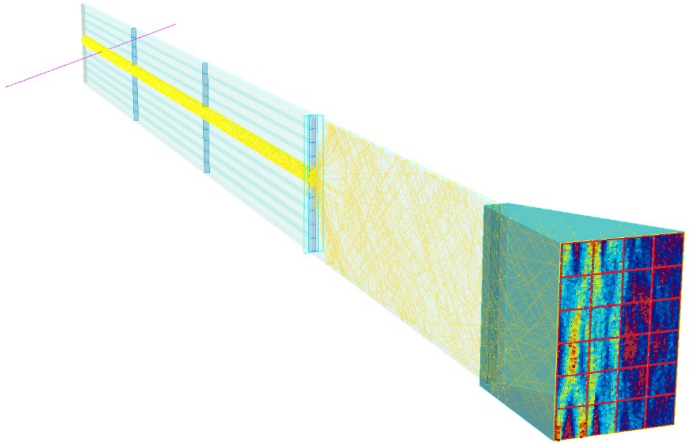
hpDIRC TDR Preparations

- Remaining Questions/Studies (expected time for answers)
  - Possibility of reusing BaBar DIRC bars (late fall)
  - Decision on plate vs narrow bars for lightguide section (late summer/early fall)
  - Optimal bar width in case new are needed (late summer/early fall)
  - ”Split-Prism” expansion volume option as part of cost/risk mitigation (late summer/early fall)
  - Potential software-based multiple scattering mitigation (late summer/early fall)

Geant4 visualization of the two light-guide options

Narrow bars in each sector
(baseline for ePIC)





Hybrid of bars and plate in each sector