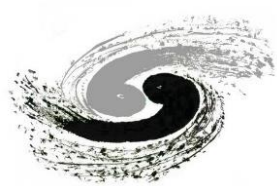


CEPC Calorimetry: considerations on preparations for TDR

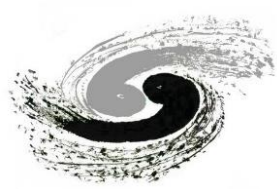
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Electromagnetic calorimetry system: crystal option

- ECAL design and PFA performance
- ECAL detector unit: crystal + photosensor (SiPM)
- Front-end electronics: multi-channel ASIC (including analog and digital circuits)
 - SiPM readout chip: single photon calibration, dynamic range, timing; power consumption; zero-suppression; trigger primitives
- Back-end electronics and DAQ
 - Data concentration, trigger logic (latency, buffer scheme): event rate, data throughput (signals + backgrounds)
- Power schemes: DC power for SiPMs, FE chips, FPGAs; DC-DC converters, inter-connection of modules
- Cooling system: active vs passive (→ mechanics system integration)
- Calibration schemes
 - Crystal-SiPM: response uniformity, temperature/humidity monitoring (← cooling scheme)
 - SiPM and FE chip (channel-/chip-wise): pedestal, gain calibration, non-linearity effects
 - Radiation damages: crystal transparency, SiPM noise + PDE
- Trigger scheme: auto-trigger (aka trigger-less readout) vs external (global) hardware trigger
- Mechanics
 - Support structure for crystal + readout PCBs + cooling (→ Can still stay hermetic? Impacts to physics?)
 - Alignment procedures → clearances/tolerances from components
 - Module assembly and system integration (including QA/QC schemes)
- Cost estimates: cost breakdown (components) and extrapolation



Planning: sub-tasks and critical issues

- ECAL general design (esp. geometry)
 - Dependent on conclusions on PFA performance with the long-bar ECAL configuration
- Front-end electronics
 - Specifications on functionality, performance, power consumption, cost estimates → FE team/experts
- Back-end electronics and DAQ
 - Top-level design and specs on trigger latency/buffer and data throughput, data cabling → BE team
- (In-situ) Calibration system: integrated onto readout PCBs
 - Specs on calibration precisions (for crystals, SiPMs, chips), cost estimates
- Beam-induced backgrounds and radiation issues
 - More relevant to the endcap calorimeter design and specs
- Cost estimates: key components, experiences with existing prototypes + extrapolation
- Other tasks
 - Trigger scheme: consistent with top-level trigger design of CEPC reference detector
 - Power scheme: voltage/current needs, module inter-connectivity, power cabling
 - Cooling service: power consumption estimates → mechanics team
 - Mechanics design and system integration → mechanics team