CEPC calorimetry status and updates

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Status and updates in July 16

- CEPC calorimeter TDR meeting in July 12, 2024 (minutes)
  - Agenda: https://indico.ihep.ac.cn/event/22870/
- Major updates
  - Simulation of beam backgrounds for crystal calorimeter
    - Updates for regions within +/- 7m from IP
    - Signal integration time window: needs better modeling in simulation (experiences from BES3)
  - Cooling for crystal calorimeterß
    - Ongoing FEA; temperature difference to be within 3℃ (a first target for given space constraints)
  - HCAL mechanics designs
    - Barrel module inter-connection; tile geometry in endcap, will focus on trapezoid shape
  - HCAL in CEPCSW
    - Barrel geometry completed, crosschecks done for insensitive area ratio (<1%)
    - Endcap sensitive volume (tile geometry) implemented; endcap absorber to be done
    - Digitization implemented and first crosschecks done (based on experiences of AHCAL beamtests)

Status and updates in July 9

- CEPC calorimeter TDR meetings: in recent two weeks
  - June 28, 2024: https://indico.ihep.ac.cn/event/22868/ (minutes)
  - July 5, 2024: https://indico.ihep.ac.cn/event/22869/ (minutes)
- Major updates
  - Beam backgrounds
    - First simulation results on beam backgrounds in barrel crystal ECAL: occupancy, rate
  - Mechanics
    - Crystal ECAL: FEA results on BGO stress and deformation, simulation with active cooling
    - HCAL barrel: inter-connection of modules, supporting structures
    - HCAL endcap: first mechanical design, FEA results on absorber stress/deformation
  - Software (CEPCSW)
    - Crystal ECAL endcap geometry implemented, crosschecks
    - HCAL barrel geometry and digitisation implemented, ongoing crosschecks
    - HCAL endcap geometry: a first design proposed, to be optimised and implemented
    - PFA performance checks (with a focus on tracking performance)

CEPC RefDet TDR: outline of calorimetry parts (July 9)

- General introduction: motivations, requirements, particle-flow-oriented calorimeters
- Calorimeter option selection for CEPC reference detector
  - Brief overview of existing technology options including prototypes and beamtests
  - ECAL: silicon-tungsten (SiW), scintillator-tungsten (ScW), segmented crystals
  - HCAL: plastic scintillator (AHCAL), glass scintillator (GSHCAL), RPC based (SDHCAL)
  - Criteria in 3 major aspects (performance, cost and technical readiness level → comparisons of existing options on the table (→ review under a dedicated mini-workshop)
  - Conclusion on baseline options for ECAL and HCAL, respectively (with arguments and discussions)
- ECAL/HCAL baseline option
  - Detector design and technical specifications for physics requirements
    - Detector modules and units; front-end and back-end electronics, trigger logics (→ crossref to related chapters)
    - Mechanics: system integration of modules, active cooling system
  - Simulation: EM/had. performance of single particles, performance of selected phys. benchmarks
  - Prototype and beamtests: key issues that have been already addressed
  - Further discussions: critical issues to be addressed in near and long future R&D activities
    - (Open)critical issues: e.g. calibration schemes, radiation damage and mitigation schemes