CEPC calorimetry status and updates

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Discussion items with IDRC chair

- Operational temperature requirements for calorimetry system
  - Barrel: room temperature
  - Endcap: to be studied, dependent on irradiation level (crystal, SiPM)
  - Temperature stability: tentatively at 0.1 degrees (performance validated in beamtest) → to be further studied for the full detector

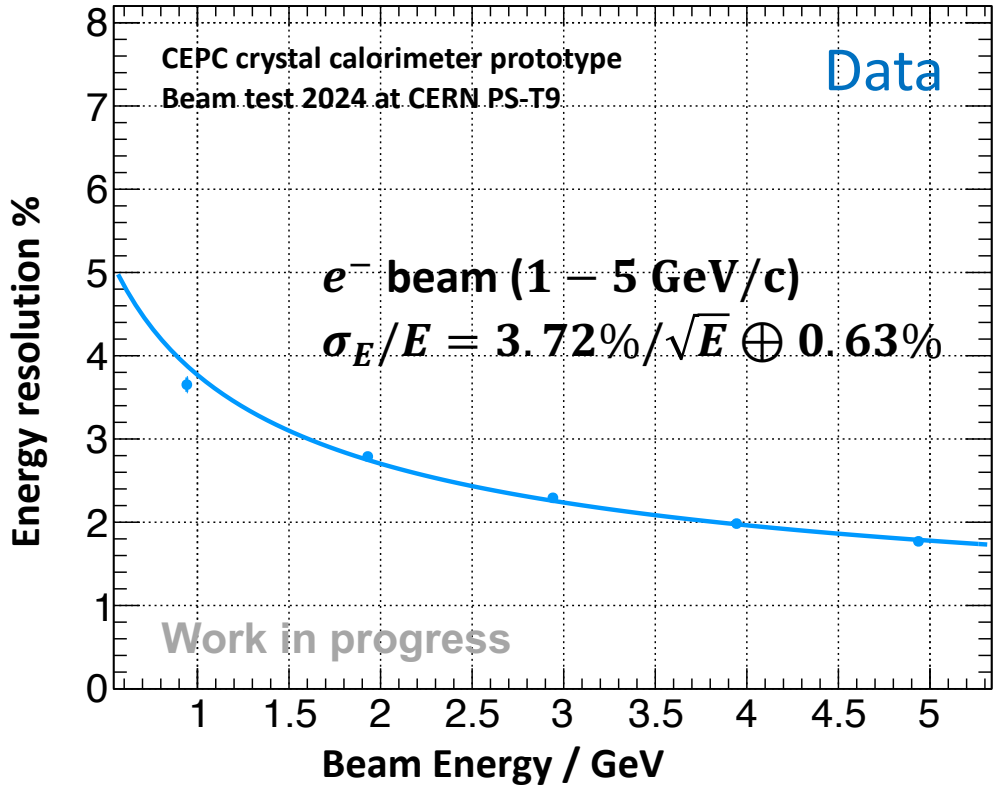
- EM calorimetry option selection
  - Need to elaborate with stronger physics motivations
  - EM calorimetry: to pursue an optimal EM resolution
  - CEPC as a *discovery* machine: use gammas as portal to probe physics cases beyond Standard Model (e.g. dark sector)

Status and updates

- CEPC calorimeter TDR meeting
  - Agenda for Aug. 9, 2024: https://indico.ihep.ac.cn/event/23204/
  - Skipped the one in Aug. 16, due to the ongoing China HEP conference
- Major updates during TDR meeting
  - Simulation of beam backgrounds for crystal calorimeter
    - Updates: results with Total Ionisation Dose (TID) and Non-Ionisation Energy Loss (NIEL) for both barrel and endcaps; ongoing crosschecks
  - Cooling for crystal calorimeter: ongoing FEA simulation
  - HCAL mechanics designs
    - Barrel region: analysis on module deformation with various loadings (absorber, glass)
    - Endcap: optimisations of inter-connections with barrel; active cooling with ¼ endcap module; estimates on the absorber thickness, tolerances in production and deformation in FEA
- Extra update
  - Performance of crystal calorimeter prototype: updates with beamtest data analysis

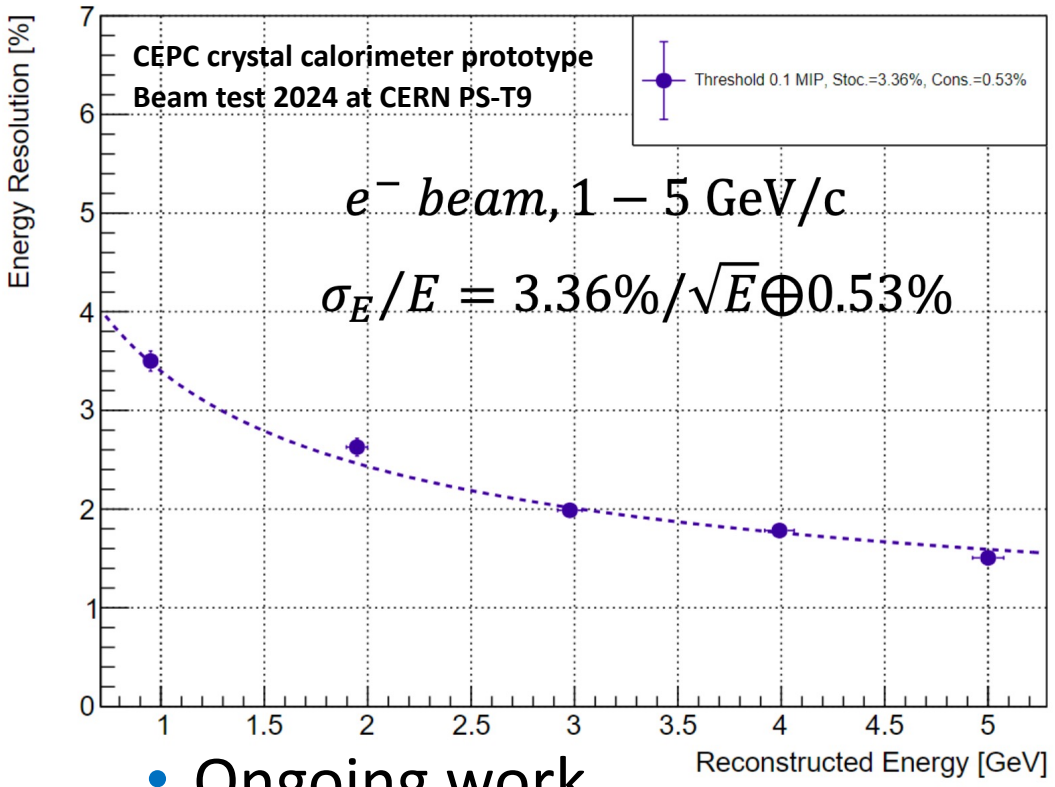
Updates: performance of crystal calorimeter prototype

ICHEP2024 result



- ~10% improvement in EM resolution
  - Improved pedestal and MIP calibrations
- Note: ~1% precision of beam momentum at PS-T09

Updated result in China HEP Conference 2024



- Ongoing work
  - Energy calibration and linearity
  - Data/MC comparison
  - EM shower profiles