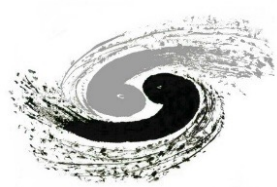


CEPC Ref-TDR ECAL updates

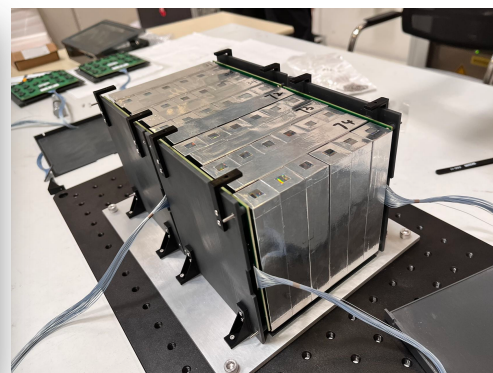
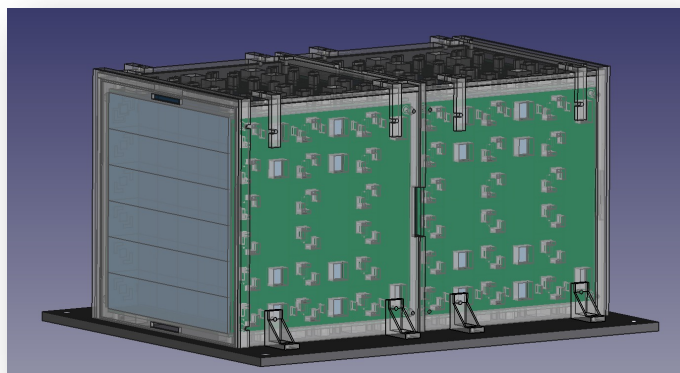
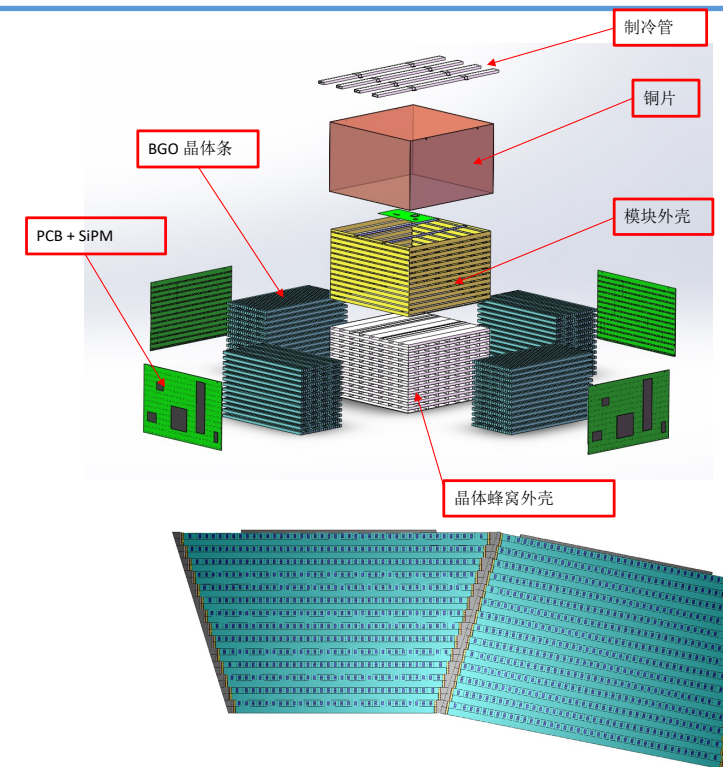
Yong Liu (IHEP)

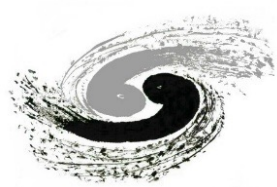
August 27, 2024



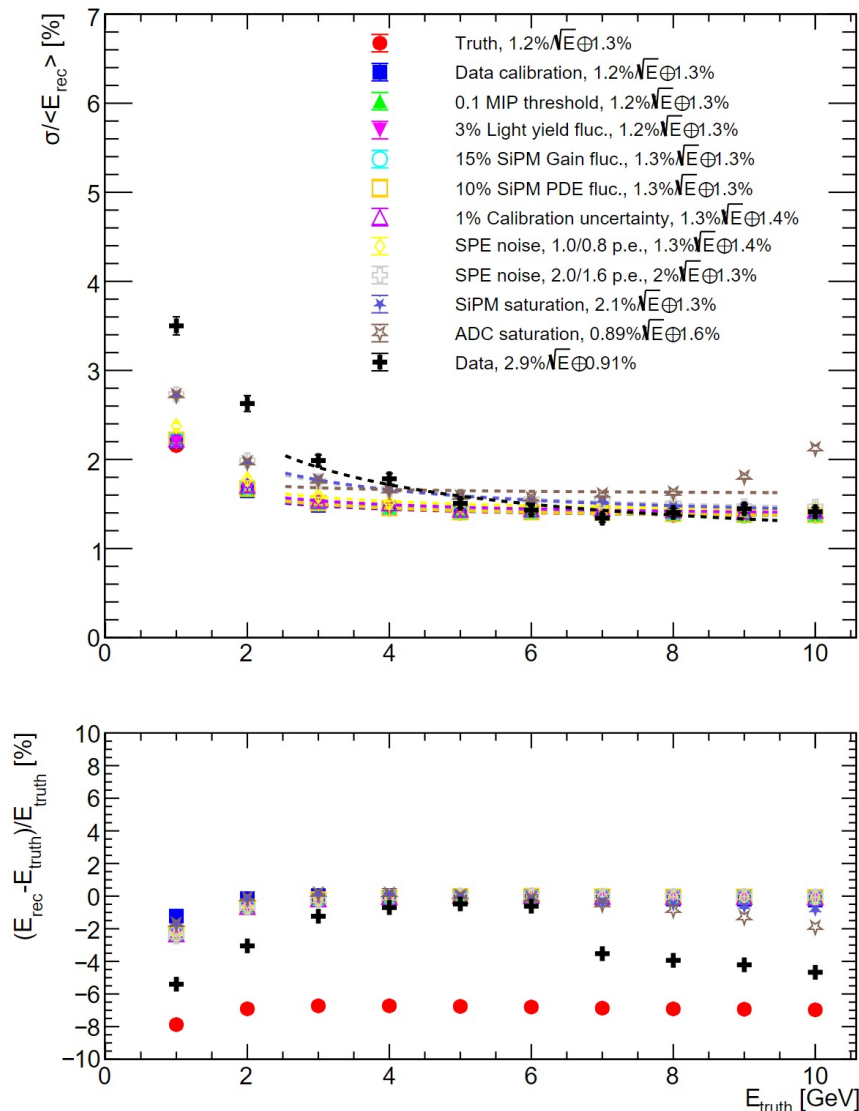
Latest updates: Aug. 20 - 26

- CEPC [Mechanics Workshop](#) in August 22 – 24
 - 3 calorimetry talks presented
 - On crystal ECAL mechanics, Shaojing will work on detailed procedures of crystal module assembly
- Crystal calorimeter prototype: EM performance
 - Updated digitisation
 - Dedicated simulation to quantify EM shower leakage

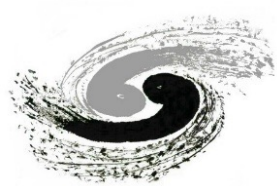




Crystal calorimeter prototype: beamtest at PS-T09

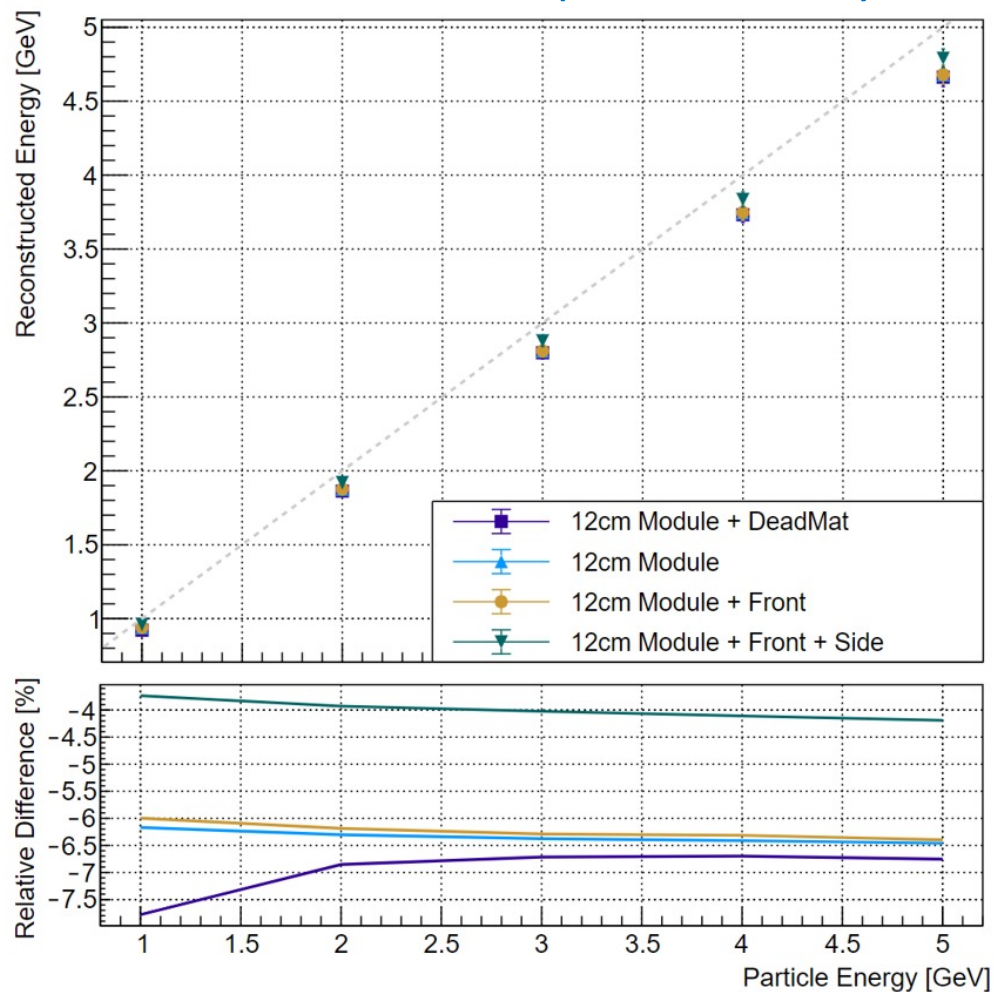


- Detailed crystal-SiPM digitisation
 - Energy threshold
 - Crystal light yield calibration precision
 - SiPM gain and PDE uncertainties
 - ASIC single photon noise
 - SiPM saturation
 - ASIC saturation: needs data for modelling
 - Beam momentum spread (1% from lattice)
- Status: still noticeable data/MC discrepancy
- (**New!**) Info from other users at CERN PS-T09
 - Beam momentum spread (preliminary $\sim 2.4\%$) larger than expected ($\sim 1\%$)
 - Will discuss with CERN beamline experts

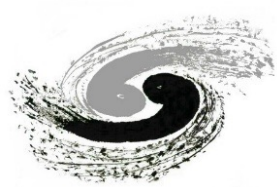


Crystal calorimeter prototype: simulation

EM shower: response linearity

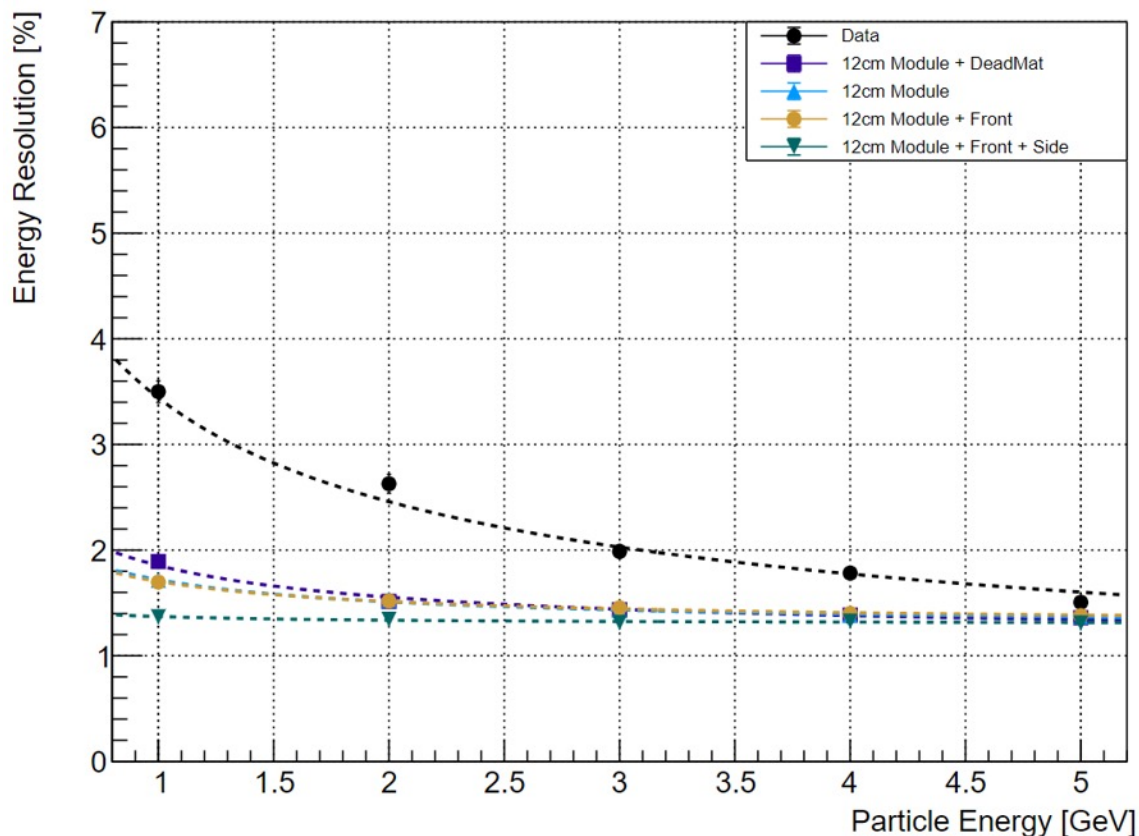


- Simulation to quantify effects of
 - Beam instrumentation materials in upstream
 - Longitudinal: back leakage
 - Longitudinal: front (albedo) leakage
 - Lateral leakage
- Contributions to response linearity
 - Back leakage: $\sim 4\%$ (24cm BGO vs sufficiently deep)
 - Lateral leakage: 2 - 2.5%
 - Albedo leakage: $\sim 0.1\%$



Crystal calorimeter prototype: simulation

EM shower: energy resolution



- Simulation to quantify effects of
 - Beam instrumentation materials in upstream
 - Longitudinal: back leakage
 - Longitudinal: front (albedo) leakage
 - Lateral leakage
- Shower leakage: impacts to EM resolution
 - Stochastic term: 1.4 - 2 %