

EPIC Barrel ECAL review charge (draft)

GD/I conveners, 12/02/2022

It is asked that the review addresses the following questions:

1. Reminder of the proposed **detector configuration** for use in the ePIC detector.
2. **Input information:**
 - a. **R&D, prototypes and their tests:** done so far, ongoing efforts, future planning (with timelines); results from prototypes and their tests.
 - b. Pertinent **information on similar technology/design** that is used by other experiments incl. R&D efforts (literature, conferences).
 - c. **Simulation studies:** already performed, ongoing and planned (with timelines); results from the simulations; particular care in (i) showing how realistic the parameters used in simulations are and (ii) reporting what is missing for a fully realistic simulation (backgrounds, specific event categories, ...)
 - d. Does the simulation take into account the **realistic light collection uniformity, response of the selected photosensors and related FEE?**
3. **Performance:**
 - a. Key plots to be shown
 - i. **Energy resolution** σ/E as a function of E (0-18 GeV) at $\eta=0, 0.5, 1$
 1. For each point, please extract FWHM and percentage of electrons within a cut window of $|E/p-1| < 1 \times \text{FWHM}$. Please provide the E/p lineshape in the backup material.
 - ii. **Angular resolution** (ϕ, η) as a function of E (0-18 GeV) at $\eta=0, 0.5, 1$
 - iii. **Pion rejection** as a function of truth momentum p (0-18 GeV/c) at 95% e efficiency at $\eta=0, 0.5, 1$
 - iv. Pion rejection versus e efficiency at truth momentum p = 1, 5, 10 GeV/c at $\eta=0, 0.5, 1$
 - v. **Separation of gamma from π^0 decay:** Separation probability as a function of p at $\eta=0, 0.5, 1$
 - vi. Reconstructed cluster energy response to E= 8 GeV single electron vs η & ϕ in the full acceptance. Please use vertex = (0,0,0), and make two 2D plots of E vs η and E vs ϕ
 - b. Comparison of the **present assessment of the detector performance compared with the YR requirements?**
 - c. In coordination with the inclusive PWG, show the performance of a key high-level physics observable, the **structure function F_L , on both statistical reach and systematic uncertainty**. This measurement requires good electron resolution and control of experimental acceptance.
 - d. Performance perspectives **beyond the YR** requirements, if any ?

4. **Sensors and FEE:**
 - a. Status of **sensor selection** (a single consolidated option, more options under consideration) and photosensor characteristics?
 - b. **Status of sensor** validation for the specific application and related potential issues?
 - c. **Perspectives of sensor mass production** and timelines for the production period?
 - d. Status of **FEE selection** (a single consolidated option, more options under consideration)?
 - e. **Characteristics of the FEEs** considered?
 - f. Status of the **FEE development** and related potential issues?
 - g. Perspectives of **FEE mass production** and timelines for the production period?
5. **Integration:**
 - a. **Status of the proposed detector integration** into the current baseline detector?
 - b. Status of the **design of the electrical/electronic infrastructure** (channels, power supplies, heat, rate)?
 - c. **Cooling** strategies?
6. **Workforce:**
 - a. **List of groups** engaged in the proposed detectors and of other groups potentially interested.
 - b. **Workforce needed with timelines and qualification of the required professional profiles;** please, include also physicists needed for dedicated simulation studies.
 - c. **Available workforce** (specifying: granted, expected, possible) by the groups proposing the detector.
7. **Cost and schedule:**
 - a. up-to-date **cost estimate** for the different components and expenditure categories.
 - b. **In-kind** contributions (specifying: granted, expected, possible).
 - c. Outline the path towards and **schedule for the full scale production.**