

# O. Tsai, P. Reimer, V. Berdnikov. ATHENA Calorimetry WG.

## Towards final detector configuration/update since the last meeting

- **WG meetings:** Mondays at 7pm ET, Indico: <https://indico.bnl.gov/category/364/>
- **Kick-off meeting May 19, discussion:**
  - The charge for calorimetry working group
  - The current choice of technologies and most urgent questions
    - Barrel HCAL, Electron arm HCAL leading institution missing
    - Barrel ECAL options
- **Following meeting May 24, discussion:**
- ANL group interesting to design the concept of the hybrid calorimeter: few layers of imaging calorimeter combined followed by sampling calorimeter in barrel region. Possibility of having a timing for a first layer (LGAD) if technology ready for day 1, possible for upgrade.
- Presentation from Miguel Arratia, interest to start working on HCAL implementations particularly high interest in AI/ML oriented analysis methods with calorimeters. Different groups recently implementing such method for old data set, as an example H1 data set.
- Presentation from Brian Page on barrel HCAL bias.
- Discussion on overall detector optimization in barrel and endcap regions, to make a first detector model without extensive simulations will be impossible. Trade-offs need to be found between energy resolution, transverse and longitudinal segmentation, and the whole system will be better AI/ML oriented from the start or as possible upgrade.
- Proposed 'over-designed' versions with 2 cm thick steel absorber, with 3 or 5mm scintillator plates between. The tile size  $3 \times 3 \text{ cm}^2$  with readout of each tile separately. Fine granularity may be re-grouped in all possible ways to come up with cost effective solution. Number of layers - determined by what is allocated in integration envelopes. Generate just one set of data which will be sufficient to make first version of detector for the proposal after optimizations.
- Expressed interest in barrel HCAL simulations from Canada group (Wouter Deconinck)

- **June 2 meeting, discussion:**

- New solenoid material impact on calorimetry: up to 2 interaction lengths of material. Most of the shower will happen in the magnet. In particular at the forward end of HCal, many of the particles of interest will not make it through. Discussion on calorimetry optimization, potential help from pattern recognition and electromagnetic calorimeters. Engineer input needed, can we get additional space?
- DD4HEP implementation: HCal implemented with benchmark sampling, work ongoing on reconstruction benchmarks, tools available for number of interaction lengths of material. Hadron and electron HCal not yet merged. eECAL implemented as a crystals, need to be implemented as hybrid crystals inner area and glass outer.

- **Additional comments/concerns**

- Still no leading institutions for electron arm and barrel HCal`s
- Meeting attendance ~12 lower than expected, we would like that steering group representative attend the meeting