Contribution ID: **172** Type: **Oral presentation using Zoom**

Homogeneous Hadron Calorimetry for superior di-jet mass resolution

Wednesday, 27 October 2021 14:12 (24 minutes)

One of the physics challenges for new detectors at an e+e- linear collider is to distinguish W and Z vector bosons in their hadronic decay mode. This requires a di-jet mass resolution of the order of the natural width of these bosons and hence a jet energy resolution of about 3%. For hadron calorimetry this means that the required energy resolution be a factor of about two better than previously achieved to date by any large-scale experiment. A novel approach to achieving superior hadronic energy resolution is based on a homogeneous hadronic calorimeter (HHCAL) detector concept, including both electromagnetic and hadronic parts, with separate readout of the Cherenkov and scintillation light. By calibrating the dual readout response to electromagnetic showers, the correlation between the Cherenkov and scintillation signals can be used to obtain superior hadronic energy resolution. This HHCAL detector concept has a total absorption nature, so its energy resolution is not limited by sampling fluctuations. It also has no traditional boundary between the ECAL and HCAL, so it does not suffer from the effects of dead material in the middle of hadronic showers. With the dual-readout approach, measuring both Cherenkov and scintillator light, the contribution to the energy resolution by large fluctuations in the determination of the electromagnetic fraction of a hadronic shower can be vastly reduced. The missing nuclear binding energy can then be corrected shower-by-shower, resulting in good energy resolution for hadronic jets. In addition, by choosing optimal calorimeter cell sizes, particle flow techniques can be used to further improve the dual readout calorimeter performance. Active materials, such as scintillating crystals, glasses or ceramics, may be used to construct an HHCAL.

1st preferred time slot for your oral presentation

15:30-17:30 JST (8:30-10:30 CEST, 2:30-4:30 EDT, 23:30-1:30 PDT)

2nd preferred time slot for your oral presentation

19:00-21:00 JST (12:00-14:00 CEST, 6:00-8:00 EDT, 3:00-5:00 PDT)

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