# detector seminar

SPEAKER: David Barney

TITLE: **The High Granularity Calorimeter upgrade project for CMS**

DATE: 20 Apr 2018, 11:00

PLACE: 40-S2-D01 - Salle Dirac


**ABSTRACT**

Calorimetry in high-energy physics is rapidly evolving, with new specifications (e.g. higher energies, enormous particle densities) and a wide variety of technologies being employed, both for signal creation and detection. Advances in large-area highly-segmented detectors based on, for example, silicon and scintillators, are providing possibilities for high-granularity calorimetry, providing unprecedented levels of information from particle showers. This talk focuses on one example of high-granularity calorimetry: The CMS HGCAL, being designed to replace the existing endcap calorimeters for the HL-LHC era. It is a sampling calorimeter, featuring unprecedented transverse and longitudinal readout segmentation for both electromagnetic (CE-E) and hadronic (CE-H) compartments. This will facilitate particle-flow calorimetry, where the fine structure of showers can be measured and used to enhance pileup rejection and particle identification, whilst still achieving good energy resolution. The CE-E and a large fraction of CE-H will use silicon as active detector material: the sensors will be of hexagonal shape, maximizing the available 8-inch circular wafer area. The lower-radiation environment will be instrumented with scintillator tiles with on-tile SiPM readout. This concept borrows heavily from designs produced by the CALICE collaboration - calorimetry for ILC etc. - but the challenges of such a detector at a hadron collider are considerably larger than at the ILC. In addition to the hardware aspects, the reconstruction of signals - both online for triggering and offline - is a quantum leap from existing detectors. We present the reasoning and ideas behind the HGCAL, its current status including design and expected performance, and the challenges ahead.


Organised by: Burkhard Schmidt (EP-DT)