



Contribution ID: 5

Type: **not specified**

Calorimetry challenges in view of LHC upgrades

Thursday, 28 November 2013 16:00 (1 hour)

The Atlas and CMS calorimeters were designed to operate for a minimum of ten years at the LHC, with an instantaneous luminosity of $2 \times 10^{34} \text{ cm}^{-2}/\text{s}$ and for an integrated luminosity of 500/fb. The electromagnetic calorimeters were designed to have an excellent energy resolution for high energy photons, which led to the observation of the Higgs boson in its 2-photon decay mode. The hadronic calorimeters were optimised for the energy resolution of hadrons and for the missing energy measurement. Both calorimeter systems are described and the performance of the calorimeters at the LHC is presented.

The high luminosity LHC (HL-LHC) is expected to provide an instantaneous luminosity of around $5 \times 10^{34} \text{ cm}^{-2}/\text{s}$ and integrate a total luminosity of around 3000/fb by about 2035 (ten years of data taking). The evolution of the Atlas and CMS calorimeters at HL-LHC is presented as well as the upgrades, which are foreseen for the detector components and the electronics, in order to allow the HL-LHC physics goals to be met.

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