CHEF 2013 abstract Submission

Title: The Role of Calorimeter Timing in Hi-Lum LHC Upgrades

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Abstract: In planning for the Phase II upgrades of CMS and ATLAS major considerations are: being able to deal with degradation of tracking and calorimetry up to the integrated doses to be expected with an integrated luminosity of 3000 fb^1 and maintaining physics performance at a pileup level of ~140. I will report on work started within the context of the CMS Forward Calorimetry Task Force and continuing in an expanded CERN RD52 R&D program integrating timing as a potential tool for pileup mitigation and ideas for Forward Calorimetry. For the past 4 years our group has focused on precision timing at the level of 10 picoseconds in an environment with rates of ~10^6-10^7 Hz/cm^2 as is appropriate for the future running of the LHC. A time resolution of 10 picoseconds is one of the few clear criteria for pileup mitigation at the LHC, since the interaction time of a bunch crossing has an rms of 190 picosec. While work on charged particle timing in other contexts (ALICE R&D) is starting to approach this precision, there have been essentially no technologies that can sustain performance at these rates. I will present results on a 10 picosecond tracker developed within the DOE Advanced Detector R&D program which is now meeting these requirements. I will also review some results from Calorimeter Projects developed within our group (PHENIX EMCAL and ATLAS ZDC) which achieved calorimeter timing precision< 100 picoseconds.