Contribution ID: **40** Type: **oral**

The CMS Tracker Phase II Upgrade for the HL-LHC era

Wednesday, May 24, 2017 4:30 PM (18 minutes)

The LHC will reach its third long shutdown period (LS3) around 2024. During this period the machine will be upgraded to the High Luminosity LHC (HL-LHC) increasing its instantaneous luminosity to 5x10ˆ34 cmˆ-2 sˆ-1. As a result, an integrated luminosity of about 3000 fbˆ-1 will be reached after 10 years of running. The drastic increase in luminosity demands for an upgrade of the CMS experiment, the so called Phase II Upgrade.

The current tracking detector of the CMS experiment will not be able to operate efficiently after LS3 mainly due to accumulated radiation damage in the silicon sensors. To ensure an efficient operation after LS3 and to profit from the high luminosity conditions, the CMS Tracker will be completely renewed.

One of the key aspects of the upgrade are newly designed silicon sensor modules, the so called pT-modules, able to provide information to the L1 trigger. Two types of modules, called PS- and 2S-module, are foreseen. The PS-modules, which will be installed in the inner regions of the CMS Tracker, consist of a silicon strip sensor and a macro pixel sensor which are stacked and closely separated. For the outer regions, the 2S-modules will be installed which consist of two stacked silicon strip sensors with parallel strip orientation. By correlating the hit positions on each sensor, information on the particle's transverse momentum can be gained since the particle tracks are bent by the strong 3.8 T magnetic field of CMS. Using this functionality, particles above a given momentum threshold can be determined and the information is send to the L1 trigger. Instead of the currently used analogue read out chips, binary chips will be used capable of correlating the hit positions of the two stacked silicon sensors.

The sensors for the pT-modules will have to withstand fluences of up to 1.5x10ˆ15 neq cmˆ-2, a factor of 10 larger than the requirement for the present Tracker. P-type base material has been chosen as it was proved to be more radiation hard and to withstand this fluence.

Primary author: KÖNIG, Axel (Institute of High Energy Physics)

Co-author: CMS, Collaboration (CMS Collaboration)

Presenter: KÖNIG, Axel (Institute of High Energy Physics)

Session Classification: R4-Semiconductor detectors(4)

Track Classification: Semiconductor detectors