

Development of the BCM' abort and luminosity system at the HL-LHC based on poly-crystalline CVD diamond pixel-pad detectors

Monday 25 February 2019 17:40 (20 minutes)

For protecting the inner detectors of experiments and for monitoring the delivered luminosity at HL-LHC a radiation hard beam monitor is being developed. The BCM' proposal consists of a set of detectors based on poly-crystalline Chemical Vapor Deposition (pCVD) diamonds and dedicated Application Specific Integrated Circuit. Due to the large range of particle flux through the detector, flexibility is very important. To satisfy the constraints imposed by the HL-LHC we propose a solution based on segmenting each single diamond sensor into multiple devices of varying size and reading them out with a new multichannel readout chip bump-bonded to the detectors.

In this talk we describe the proposed system and present results from the first prototypes of multichannel pCVD diamond sensors wire-bonded to the FE electronics produced in 65 nm TSMC technology. The prototype system characterized in test beams with 120 GeV hadrons at the CERN SPS and 260 MeV pions at PSI will be presented. Preliminary results for the amplitude distribution across the device will be presented at different negative and positive voltages. In addition, the noise distribution and efficiency will be presented. Based on the preliminary results further development of the system will be discussed.

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Session Classification: Session 3: Radiation effects in HEP experiments