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Diamond particle detectors systems in high energy physics

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With the first three years of the LHC running complete, ATLAS and CMS are planning to upgrade their innermost tracking layers with more radiation hard technologies. Chemical Vapor Deposition (CVD) diamond is one such technology. CVD diamond has been used extensively in beam condition monitors as the innermost detectors in the highest radiation areas of BaBar, Belle, CDF and all LHC experiments. This talk will describe the lessons learned in constructing the ATLAS Beam Conditions Monitor (BCM), Diamond Beam Monitor (DBM) and the CMS Pixel Luminosity Telescope (PLT) all of which are based on CVD diamond with the goal of elucidating the issues that should be addressed for future diamond based detector systems. The talk will also present the first beam test results of prototype diamond devices with 3D detector geometry that should further enhance the radiation tolerance of this material.

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