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Development of CVD Diamond Tracking Detectors for Experiments at High Luminosity Colliders

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Diamond was studied as a possible radiation hard technology for use in future high radiation environments. With LHC upgrades expected, all LHC experiments are planning for detector upgrades which require radiation hard technologies. Chemical Vapor Deposition (CVD) diamond has now been used extensively in beam conditions monitors as the innermost detectors in the highest radiation areas of BaBar, Belle and CDF and is installed in all LHC experiments. As a result, this material is now being discussed as an alternative sensor material for tracking very close to the interaction region of the super-LHC where the most extreme radiation conditions will exist.

RD42 collaboration continued making progress in diamond detector technology. Polycrystalline and single-crystal chemical vapor deposition (pCVD and scCVD) diamond detectors were constructed, irradiated and tested. Beam test results of irradiated diamond showed that both pCVD and scCVD diamond follow a single damage curve allowing one to extrapolate their performance as a function of dose.

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