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Radiation Damage Compensation in Diamond Sensors for Heavy-Ion T0 Detectors

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Radiation damage in diamond sensors is one of the main challenges in experiments performed at high intensities. This issue is particularly relevant for T0 detectors used in heavy-ion research. To significantly extend the lifetime of T0 detectors, we proposed a dedicated amplifier system that compensates for radiation-induced degradation. In this presentation, we will introduce a working system based on a two-stage amplification scheme, connected to discriminators and TDCs implemented in FPGA. Test results demonstrate that the operational lifetime of the system can be extended by at least a factor of 170, while maintaining excellent performance: nearly 100% efficiency and time resolution below 50 ps.

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