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An FPGA-based Quench Detector and Data Acquisition System for Superconducting Insertion Devices

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A novel quench detector and post-mortem system for superconducting insertion devices are developed. This module consists of two functional components: quench detection and output latch signals for interlock purpose, which is based on field-programmable gate array, and a data acquisition system based on a set of simultaneous sampling ADC modules. The data acquisition system has two concurrent modes of operation: A fast capture mode that is triggered by a user specified of coil quench voltage at sampling rates up to 500 kHz, and a continuous data mode that can real-time monitor data at 10 Hz rate using the same acquisition system. The system was designed with a modular structure using commercially available hardware. This approach makes the new system easily scalable for superconducting insertion devices with coil and lead voltage tap configurations. A detailed description of the system along with test results is presented in this paper.

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