

Real-Time Signal Processing for Large-Volume Cyclotron Radiation Emission Spectroscopy

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The Project 8 collaboration seeks to measure the absolute neutrino mass using tritium beta decays and a new spectroscopy technique, Cyclotron Radiation Emission Spectroscopy (CRES). The initial phases of Project 8 demonstrated that CRES could be used to detect single-electron cyclotron radiation, and could be applied to measure the tritium beta-decay spectrum. The current phase of Project 8 will use a cylindrical array of up to 75 radio-frequency antennas to detect the cyclotron radiation from electrons in a $\sim 10 \text{ cm}^3$ fiducial volume. The data-acquisition and signal-processing (DAQ) system will assemble the signals from the antenna array using digital beamforming, and perform real-time triggering and reconstruction of the electron events. The digital-beamforming aspect presents a compelling challenge in designing a real-time DAQ system. We will present the DAQ architecture that is under development, and how we plan to address the DAQ requirements of the upcoming experiment.

TIPP2020 abstract resubmission?

No, this is an entirely new submission.

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