

Optimization of Timepix2 Power Consumption and Spectroscopic Performance for Space Applications

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ABSTRACT: Low-mass, low-power radiation detectors are needed to monitor and predict space weather conditions for future crewed and autonomous space missions. The Compact Electron Proton Spectrometer (CEPS) combines Timepix2 ASIC technology with CdTe chips to form a small, portable, hybrid-pixel detector package capable of differentiating particle types and energies over a wide dynamic range in a mixed-radiation environment. In this work, we investigate the performance of a Timepix2 for different operating voltages, internal DAC settings, and clock frequencies. The impact on analog and digital power consumption is characterized for different settings while utilizing a 500 μm thick Si sensor. The results of these studies will inform parameter tuning and device settings for the CEPS CdTe hybrid-pixel detector.