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Development of the Test-bench "Wukong" for Readout Electronics and Pulse Digitizer

To meet the multi-channel and high trigger rate sampling requirements of CIGAR (ChIna Gamma trAcking aRray) single-point electrode and multi-electrode HPGe (high-purity germanium) detectors, a high-speed and high-precision dedicated readout electronics system "Wukong"based on Xilinx ZYNQ XC7Z100 was developed, including the system motherboard and high-speed, high-precision ADC mezzanine card based on 125MSPS, 16-bit AD9653 from ADI and 1GSPS, 13-bit ADC13B1G. The system motherboard can carry 9 ADC mezzanine cards, including 4 JESD204B interface standard ADC mezzanine cards and 5 LVDS/LVCMOS interface standard ADC mezzanine cards. According to actual needs, the system supports up to 20 channels of 125MSPS, 16-bit high-speed high-precision data acquisition, processing, and dual Gigabit Ethernet readout at ˜175MB/s. The measured ENOB of AD9653 and ADC13B1G are 12.25 and 10.45, respectively, which could meet the CIGAR project needs. In addition, the influencing factors of ADC ENOB including the noise of ADC driver and ADC sample clock jitter were analyzed and verified based on the ADC mezzanine card based AD9653. The simulation and experiment results conclude that the quality of the clock (RMS jitter 10fs˜1ps) has little effect on ENOB (within 0.1-bit) when the input frequency is below 10MHz.

Minioral

Yes

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No

Are you a student?

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