

# 面向前沿物理实验的高带宽数据采集系统设计与研制

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The Jinping Neutrino Experiment(JNE), conducted within the China Jinping Underground Laboratory, aim to detect and analyze of solar neutrinos, Earth neutrinos, and supernova neutrinos. JNE detector will be upgraded from 30 channels to 60 channels, which will increase the data bandwidth by one to two orders of magnitude and exceed the capacity of the current CAEN DAQ system. Additionally, enhancing the performance and flexibility of JNE DAQ system is also a crucial aspect. This paper presents the design of new Tsinghua DAQ system for JNE and performance and stability of it. The new Tsinghua DAQ(THDAQ) system for JNE is based on the cPCI protocol and demonstrates powerful performance improvements: ADC ENOB of THDAQ system is approximately exceeds 9.8-bit, marking a 14% improvement over the CAEN DAQ system; The maximum of clock deviation within a single chassis is 85.6 ps, satisfying sub-nanosecond synchronization criteria; Each DAQ board features two QSFP+ optical ports with 82.5Gbps transmission capability, while the PCIe board supports a transmission rate of 100.2 Gbps. Furthermore, comparative experiments between two systems were also tested in detail. The analysis results of waveform and charge spectrum prove the high stability of THDAQ system. It provides a foundation for the 60-channel and 4000-channel DAQ systems.

## Collaboration (if any)

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