



Contribution ID: 433

Type: Oral presentation

## An Ultra-high Speed Waveform Digitizer for the Applications of ICF Experiment

Wednesday 13 June 2018 10:30 (20 minutes)

In the inertial confinement fusion (ICF) experiment, there is a growing demand for ultra-high speed waveform digitizer, so as to realize the accurate measurement of various physical quantities for plasma diagnosis. However, the commercial oscilloscopes are of low precision and large volume for some physical experiments. Especially in the ICF experiment with strong radiation, whether using long cables to keep the oscilloscopes away from the radiation or shielding the oscilloscopes in the experimental field is not convenient for accurate measurement.

Aimed at this demand, we design an ultra-high speed waveform digitizer which can meet the requirements of a variety of measurements such as time, energy and pulse waveform discernment and so on in ICF experiment. The digitizer consists of three parts: analog-to-digital conversion, cache, and data up-link. The detector signal is digitized through fast ADC. Then, the digital data is cached in an external DDR3 memory stick through FPGA. The data can be uploaded to PC via Ethernet.

The waveform digitizer has 10 bits with a sampling rate of 5G/s and bandwidth of 1G, the ENOB reaches 8.2bit@120M. The capacity of the DDR3 memory stick is 4GB so that it can record signals longer than 600ms. In the strong radiation environment of "Sheng Guang II" ICF experiment with the laser power of 0.3 PW, the digitizer works well. Contrast tests with a commercial oscilloscope (Tektronix DPO4104B 5G/s BW1G) show that it performances much better.

### Minioral

Yes

### Description

acq board

### Speaker

Weigang Yin

### Institute

USTC

### Country

China

**Author:** Mr YIN, Weigang (University of Science and Technology of China)

**Co-authors:** Dr CHEN, Lian (University of Science and Technology of China); Dr LI, Feng (University of Science and Technology of China); Dr LIANG, Futian (University of Science and Technology of China); JIN, Ge (Univ. of Science & Tech. of China (CN))

**Presenter:** Mr YIN, Weigang (University of Science and Technology of China)

**Session Classification:** Fusion