



Contribution ID: 161

Type: Mini Oral and Poster

The electronics of the Juno Experiment central detector

Monday 12 October 2020 16:34 (1 minute)

The Jianmeng Underground Neutrino Observatory (JUNO) will be the largest, liquid scintillator (LS) underground neutrino experiment. Juno is under construction in the South of China and its main purpose is to measure the neutrino mass hierarchy. Thanks to its large mass, 20 kton of LS, it will perform several measurements, from the precise measurements of oscillation parameters to the detection of neutrinos coming from SuperNovae. The central detector is made of a sphere of 20kt LS surrounded by about 18000 20" (large) and 25000 3" (small) photomultipliers. An essential ingredient for the neutrino mass hierarchy measurement is excellent energy (3% at 1 MeV) and time resolutions. These requirements will be satisfied thanks to the full PMT waveform acquisition with a large dynamic range (from 1 to 1000 photo-electrons). In order to satisfy these challenging requirements, the Front End electronics will fully exploit the use of a set of 14 bits Flash ADC, a medium-sized FPGA and a dedicated synchronization and trigger system that distributes the clock to all the channels, synchronizes the timestamp and manage the validation of the trigger primitives sent by each channel. The front end electronics will be placed underwater, and the reliability of such devices will be a primary concern. The data readout is performed with a 1Gb/s Ethernet Links, connecting groups of three PMT to the 'dry' electronics. This paper presents an overview of the electronics of the central detector with results on tests performed on the prototypes of the full electronics and trigger chains.

Minioral

Yes

IEEE Member

No

Are you a student?

No

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Session Classification: Poster session A-01

Track Classification: Front End Electronics and Fast Digitizers