Development of the Quality Control System of the Readout Electronics for the Large Size Telescope of the Cherenkov Telescope Array observatory



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The Dragon Board is the readout board of the Large Size Telescope of the Cherenkov Telescope Array [1,2].

Having to record very fast signals in a noisy environment where the background frequency can reach up to 400 MHz (photolectrons per pixel per second), a fast digitization speed of the readout system coupled to a fast photosensor like a photomultiplier tube (PMT) is crucial to increase the pixel signal-to-noise ratio [3].

We have developed an automated quality control system in order to certify that the board production fulfills specific qualification standards.

The system will be used in the company production line in order to identify faulty components and react in short time for fixes to deliver a full set of working boards.

References:

[1] The CTA Consortium, *Design concepts for the Cherenkov Telescope Array CTA: an advanced facility for ground-based high-energy gamma-ray astronomy*, Experimental Astronomy (2011) 32:193-316, arXiv:1008.3703 [astro-ph.IM]

[2] Cherenkov Telescope Array home page, https://portal.cta-observatory.org/

[3] H. Kubo et al, Development of the Photomultiplier- Tube Readout System for the CTA Large, Size Telescope, ICRC 2013, arXiv:1307.3386 [astro-ph.IM]



The DRAGON Board

The Dragon Board (currently version 5) is provided with an integrated test pulse generator. In order to run the test, no external waveform generator is needed.

Required interfaces: • power supply (24 V, CC)

• a workstation with a Gigabit Ethernet interface.

The duration of a basic quality control test is about 10 minutes, short enough to be performed **in the production line**.





Linearity Test

Crosstalk measurement

Pulse shape analysis



Postive Cross Talk (High Gain Channel)



Hostive Cross Talk (Low Gain Channel)





Negative Cross Talk (Low Gain Channel



Pulse FWHM (from Gaussian fit)

