



Contribution ID: 451

Type: **Poster contribution**

## Development of an automatic test system for the PMTs used in the BGO ECAL of DAMPE

*Thursday, 30 July 2015 15:30 (1 hour)*

An automatic system has been developed for the batch test of the photomultiplier tubes (PMTs) in the BGO electromagnetic calorimeter (ECAL) of Dark Matter Particle Explorer (DAMPE). There are 616 PMTs (Hamamatsu R5610A-01) used in the BGO ECAL, which are critical for the realization of high dynamic readout and high precision measurement of the scintillation light from BGO crystals. In order to cover the large dynamic range of energy measurement of DAMPE, signals are read out from three dynodes of the PMTs. The charge ratios of the dynodes are of paramount importance to the energy reconstruction of high energy incident particles so that all the PMTs must be tested and calibrated. In addition, considering of the high reliability and quality requirements as a space-borne experiment, over 800 PMTs were tested during the mass production and screening procedure both for the Qualification Model and the Flight Model. Therefore, a light-emitting diode (LED) based system was designed to test the performance of PMTs automatically. The test system is composed of a signal generator, a LED driver module, a dark box, and a readout system which consists of front end electronics (FEE) board, data acquisition (DAQ) board and a data acquisition software based on Labwindows/CVI. An arbitrary waveform generator drives the LED source for illuminating 22 PMTs through optical fibers in one dark box. Then 66 dynode signals are read out by a FEE board, sent to DAQ module, stored in the computer and finally analyzed with a root program. As two dark boxes can be controlled simultaneously by the readout system, it takes about 30 minutes to test 44 PMTs per time, which reduces the workload greatly and guarantees the project schedule. The details about this system and the test results are presented in this paper.

### Registration number following "ICRC2015-I"

400

**Primary authors:** FENG, Changqing (University and Science and Technology of China); DONG, Jianing (USTC); LIU, Shubin (USTC); WEN, Sicheng (USTC); WANG, Xiaolian (Univ. of Science & Tech. of China (CN)); ZHANG, Zhiyong (USTC); SHEN, Zhongtao (USTC); XU, Zizong (USTC); ZHANG, yunlong (USTC)

**Presenter:** DONG, Jianing (USTC)

**Session Classification:** Poster 1 DM and NU

**Track Classification:** DM-IN