
Status of CANGAROO-III

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Abstract

The CANGAROO-III project started stereoscopic observations of sub-TeV gamma-rays from Dec., 2002, near Woomera, South Australia. Here, we report on the present status of the project. Details of calibration and analysis procedures are given, and the initial performance of the stereo system is described.



Fig. 1. The CANGAROO-III telescope system. This photograph was taken in Dec., 2002.

1. Introduction

CANGAROO-III started stereoscopic observations of sub-TeV gamma-rays from Dec., 2002. A photograph of the three telescopes is shown in Fig. 1. From left to right, the second (T2), third (T3), and first (T1) telescopes are shown. Each is placed at the corners of a triangle (approximately 100 m apart from each others [1]). The camera of T3 will be installed in June, 2003 [2]. Stereo observations with T1 and T2 started from Dec., 2002.

2. Performance of the second telescope (T2)

The performance of the T2 camera system was greatly improved due to new light guides, etc [2]. Also, a minor problem involving deformation of the plastic mirrors was solved [3]. The energy threshold of T2, therefore, should be improved from that of T1, which was estimated to be 450 GeV for gamma-rays [4].

The pixel gain uniformity was measured, and is shown in Fig. 2 (left). It was uniform to 10%. After applying a correction, we obtained uniformity within software to the several percent level. In each pixel, the single photon spectrum is clearly seen, as shown in Fig. 2 (right). Presently, the pixel threshold is estimated to be 7.6 photoelectrons (p.e.). The details of the T2 analysis are presented in Ref. 5.

3. Stereo performance

In the stereo mode, the energy threshold was governed by that of T1 (approximately 450 GeV for gamma-rays). Actually, most T1 events were coincident

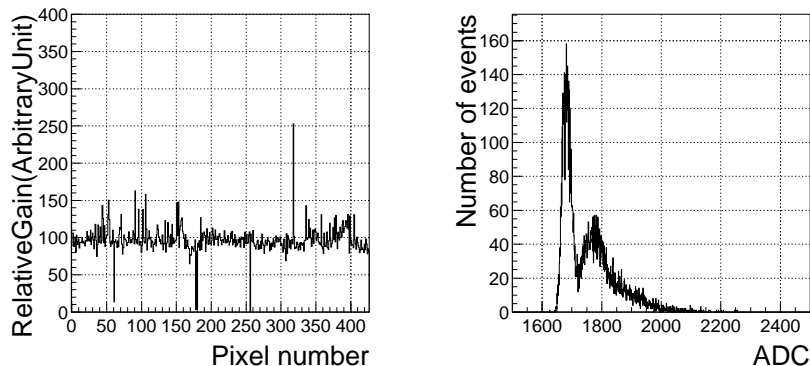


Fig. 2. Left: Pixel gain distribution. Right: Single-photon spectrum.

Table 1. Recent observation targets.

Period	target	mode	analysis	comments
Dec 2002	Crab	stereo		technical run
	EXO 055625–3838.6	stereo	on going	new target
Jan-Feb 2003	RX J0852.0–4622	stereo	on going	confirmation
Mar-Apr 2003	RCW 86	stereo	on going	confirmation
May 2003	SN 1006	stereo		spatial distribution
Jun-Aug 2003	PSR 1706–44	stereo		spatial distribution
	RX J1713.7–3946	stereo		spatial distribution

with T2 events. An example of a stereo event is shown in Fig. 3 (left). The left figure shows two ADC images obtained by T1 (lower) and T2 (upper). The intersection of the long axes coincides with the center of the field of view in this event. The details of the online system for stereo observations can be found in Ref. 3. The right histograms are the total ADC counts for T1 (lower) and T2 (upper) in the coincident events. The peak positions differ by a factor of 2–3. From calculating the cosmic-ray rate, we obtained the preliminary energy threshold for T2 of 320 GeV for cosmic-ray events [2], compared to that T1 cosmic ray energy threshold of 800 GeV [7].

4. Observations

The recent observation schedule is given in Table 1. The results shown in this report are based on the data of RX J0852.0–4622. The full details, including the energy threshold of T2, the performance of the stereo mode, etc. will be presented at the conference.

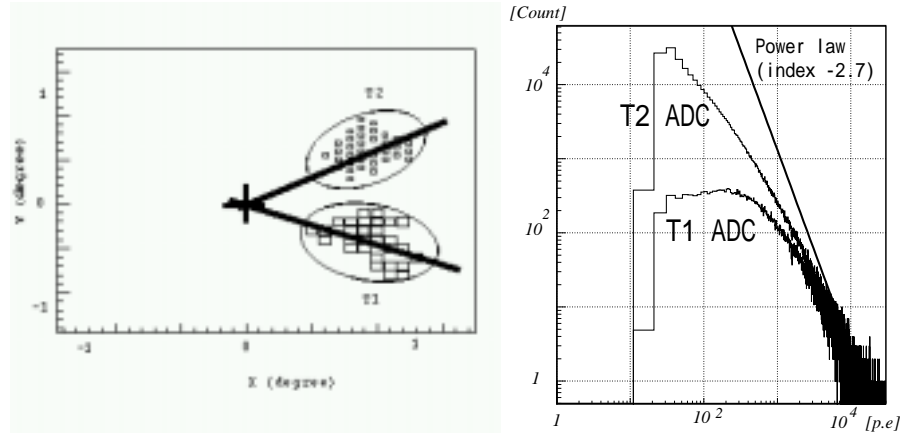


Fig. 3. Left: Event obtained by the stereo mode. Right: Distributions of total ADC counts of T1–T2 coincident events. The histograms are those for T1 (lower) and T2 (upper), respectively. The line is proportional to $E^{-2.7}$.

5. Summary

The preliminary results of CANGAROO-III stereoscopic observations are presented. The energy threshold of the second telescope has been demonstrated to be lower than that of the first telescope. Presently, the performance of stereo observations is in good shape. Further details concerning the energy threshold, angular resolution, effective area, etc. will be presented at the conference.

6. References

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