SEARCH FOR GALACTIC γ-RAYS WITH ENERGIES GREATER THAN 500 MeV ON BOARD OGO-5

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A cosmic ray detector, sensitive to γ-rays with energies greater than 500 MeV is being flown on board the OGO-5 satellite. The spacecraft was launched into a highly eccentric orbit, apogee 145000 km, on March 4, 1968. γ-ray observations are restricted to altitudes higher than 80000 km, thereby excluding interference from the radiation belts and reducing the influence from the earth albedo flux. A description of the instrument is published in the literature (Rogowski *et al.*, 1969).

The peak sensitivity of the detector for a line source is 2–3 cm^2 rad with a FWHM of approximately 30°.

About 700 hrs of useful data have been analysed, covering the period from March 20 to July 1, 1968. During this period the orbital plane was almost perpendicular to the galactic equator. Part of the sky, effectively 30° wide, at $l^{II} = 60°$ and ranging from $b^{II} + 25°$ to $b^{II} = -35°$ has been scanned.

It is not possible to derive absolute values for the γ-ray intensities, because of the presence of cosmic ray induced background. Nevertheless, a search can be made for an increase in counting rate towards the galactic plane, provided the background rate does not vary with the position in orbit.

The observed counting rates of γ-ray events with energies greater than 500 MeV are listed in Table I for 5 intervals of b^{II}. The observed rates of charged particles, which could contribute to the background and the guard counter rates, are also listed. Changes in background, if any, are certainly smaller than the statistical uncertainties in the γ-ray rates. Contribution of earth albedo to the γ-ray events is estimated to be less than 10^{-5} counts/sec.

The present data only allow us to derive an upper limit for the galactic γ-ray intensity, namely:

$$N_\gamma(> 500 \text{ MeV}) \leqslant 7 \times 10^{-5} \text{ cm}^{-2} \text{ sec}^{-1} \text{ rad}^{-1}.$$

In Figure 1 the actual rates and the expected response to such a line intensity are plotted.

By analysis of all available data (>7000 hrs) an intensity of $(2\text{–}4) \times 10^{-5}$ cm^{-2} sec^{-1} rad^{-1} expected from the measurement of Clark *et al.* (1968) above 100 MeV from the same region of the galactic plane should be observable.

L. Gratton (ed.), Non-Solar X- and Gamma-Ray Astronomy, 297–299.

TABLE I

Observed counting rates for γ-ray events and charged particles

	Directions of detector axis $l^{II} = 60° \pm 5°$				
	$25° > b^{II} > 20°$	$20° > b^{II} > 10°$	$10° > b^{II} > -10°$	$-10° > b^{II} > -20°$	$-20° > b^{II} > -35°$
Observation time (hrs)	29.0	83.6	305.8	135.9	104.2
'γ-rays' > 0.5 GeV (c/s) $\times 10^3$	$0.24 \pm .05$	$0.39 \pm .04$	$0.30 \pm .02$	$0.31 \pm .02$	$0.29 \pm .03$
Charged particles (c/s) $\times 10^3$	$15.2 \pm .4$	15.5 ± 0.2	$15.1 \pm .1$	$14.9 \pm .2$	$15.3 \pm .2$
Guard counter rate (c/s)	687	679	664	660	671

https://doi.org/10.1017/S0074180900004435 Published online by Cambridge University Press

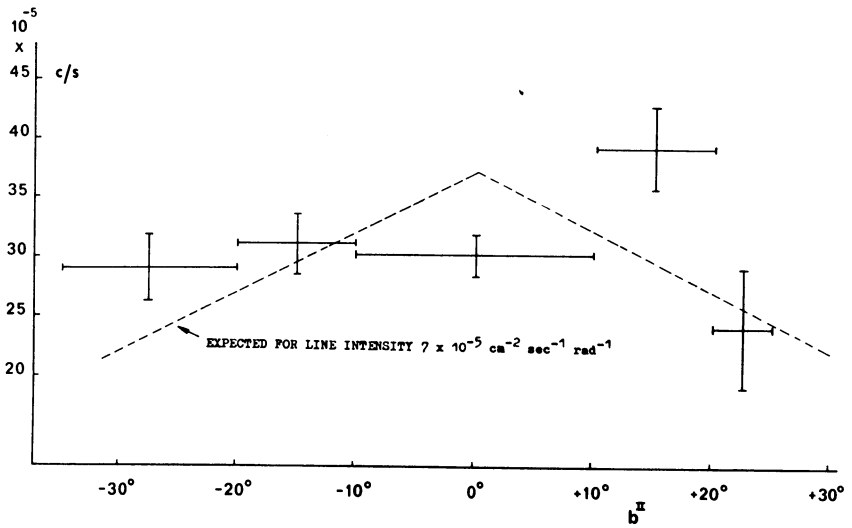

Fig. 1. Counting rates for γ-ray events > 500 MeV at $l^{II} = 60°$
Beam width (FWMH): 30°.

References

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https://doi.org/10.1017/S0074180900004435 Published online by Cambridge University Press