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GAMMA-RADIATION WITH $E_\gamma > 5$ MEV DETECTED FROM SEYFERT GALAXY 3C120 AND REGION WITH $l'' = 190°$ AND $b'' = 20°$

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The observation of the Galaxy anticentre region in gamma-rays with $E_\gamma = 5 \div 100$ MeV was made by gamma-telescope "Natalya-1" in a balloon flight on 06.11.80 at 15.00-24.00 UT. The flight was performed at the ceiling 5.1 ± 0.1 g/cm^2, magnetic cutoff being 17 GV. The description of the instrument and the analysis of the experiment conditions are given in /1,2/. The region of the sky with coordinates $\alpha = 4^h \div 8^h$, $\delta = -20° \div 60°$ was observed during the flight. The tracks of electron-positron pairs generated by gamma-quanta in the convertors were detected by wire spark chambers. The recorded events were classified manually by an operator using a graphic display into three classes: "pairs", "single" and "bad" events. The arrival angle of gamma-quanta and their energy for selected gamma-ray events ("pairs" and "singles") were determined through multiple scattering of pair components in the convertors.

On the basis of the data obtained the celestial maps were made in gamma-rays for $E_\gamma > 5$ MeV and $E_\gamma > 20$ MeV energy ranges.

The search for discrete gamma-ray sources was carried out with the use of a cross-correlation method similar to that described in /3/. Cross-correlation maps were plotted for $E_\gamma > 5$ MeV and $E_\gamma > 20$ MeV. Fig.1 shows the map for $E_\gamma > 5$ MeV. The fluxes of gamma-radiation from the Crab Nebula source in $5 \div 20$ and $20 \div 100$ MeV ranges were obtained on the basis of the determined excess taking into account the instrument efficiency and real time exposure of the source. They were equal to $(2.1 \pm 0.5)\cdot 10^{-5}$ and $(1.0 \pm 0.3)\cdot 10^{-6}$ cm^{-2}s^{-1}MeV^{-1}, respectively /2/. The excesses of gamma-radiation with $E_\gamma > 5$ MeV were also detected from $\alpha = 4^h 28^m$, $\delta = +6°$ region containing 3C120 source and from $\alpha = 7^h 20^m \pm 20^m$, $\delta = 28° \pm 5°$ region.

The corresponding integral flux for 3C120 in $E_\gamma > 5$ MeV energy range is $(3.6 \pm 1.2)\cdot 10^{-4}$ cm^{-2} s^{-1}. The cross-correlation

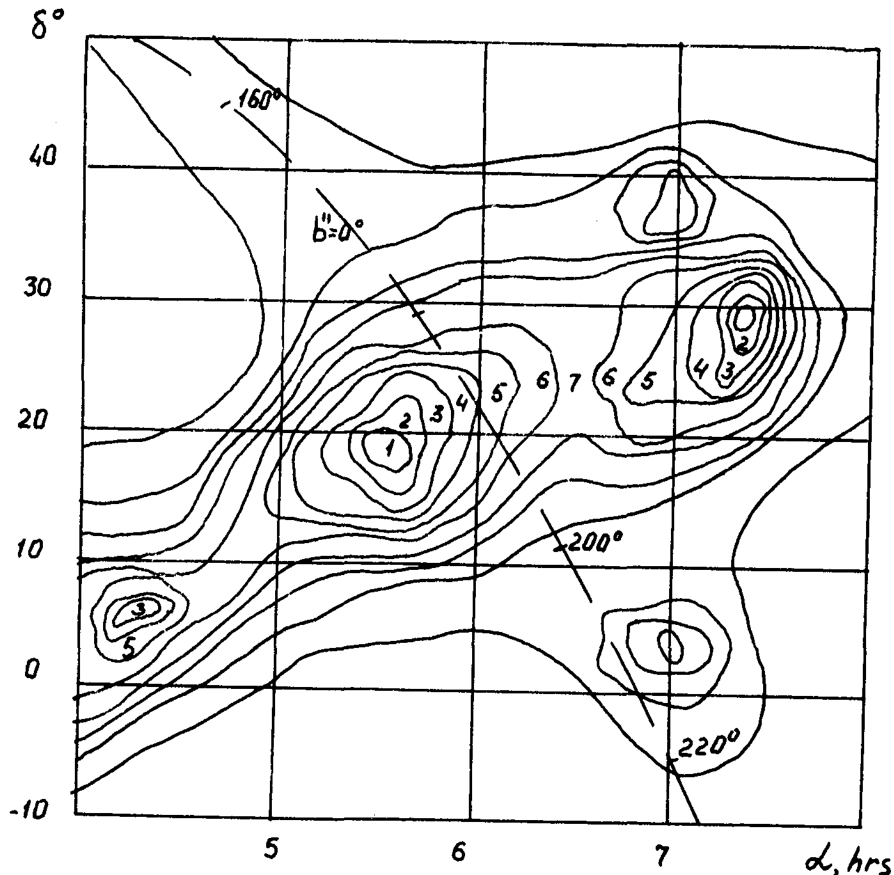

Fig.1. Cross-correlation map of the Galaxy anticentre region for $E_\gamma > 5$ MeV. (The curves correspond to the following intensities:(3.2; 2.9; 2.8; 2.6; 2.4; 2.2; 2.0; 1.8)$\cdot 10^{-3}$ s^{-1}).

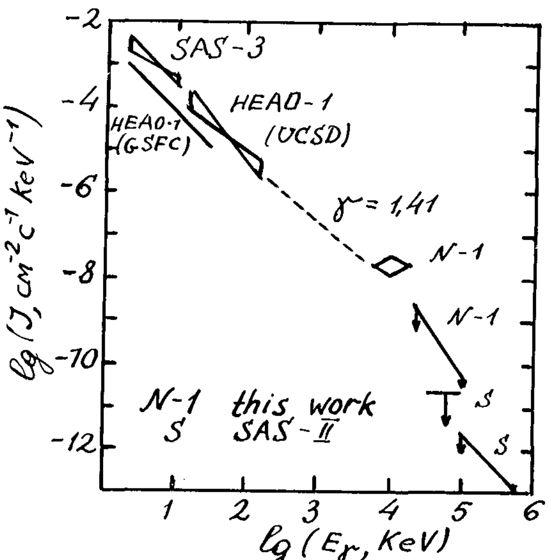

Fig.2. Seyfert Galaxy 3C120 gamma-spectrum.

analysis for gamma-quanta with $E_\gamma > 20$ MeV has not revealed any significant radiation excess in this region and the corresponding upper limit of the flux at 90% confidence level is $0.8 \cdot 10^{-4}$ cm^{-2} s^{-1}. These fluxes are shown in Fig.2 along with some other experimental data on this subject. The confidence level of the excess existence for the sources mentioned are presented in the Table.

The obtained data make it possible to determine the luminosity in the low-energy range of gamma-quanta. Assuming the spectrum to be power law and taking an upper limit obtained for $E_\gamma > 20$ MeV as the flux at that energy we can have $\alpha = 2.5$. The spectrum then will be $J(E)=7\cdot10^{-3}\ E^{-2.5}cm^{-2}\ s^{-1}\ MeV^{-1}$ and the energy flux in 5÷20 MeV range is $F=5\cdot10^{-9}$ erg/cm · s.

Table. Fluxes of different sources in gamma-range detected by gamma-telescope "Natalya-1".

Source	Coordinates		E_γ, MeV	Significance	Flux $10^{-4}cm^{-2}s^{-1}$
	α	δ			
Crab Nebula	$5^h\ 30^m$	19°	5-20	0.999	3.6
			20-100	0.998	0.9
3C120	$4^h\ 24^m$	6°	5-100	0.994	3.6
			20-100	0.9	0.8
G(190-20)	$7^h\ 20^m$	28°	5-100	0.97	4.2
			20-100	0.88	0.9

The corresponding luminosity is $L=2.3\cdot10^{46}$ erg s^{-1} (Z=0.032, H = 50 km/s Mps , P = 200 Mps). Such luminosity is comparable with that of seyfert galaxy MCG 8-11-11 ($L\sim7\cdot10^{46}$ erg/s) in the energy range (0.09 ÷ 3) MeV /4/ and with that of 3C120 quasar ($L\simeq2\cdot10^{46}$ erg/s) in the energy range (10 - 1000) MeV.

The luminosity of 3C120 for $E_\gamma > 100$ MeV does not exceed $2.7\cdot10^{45}$ erg/s /5/, that indicates to a maximum of luminosity at the energy of several MeV as in the case of quasar 3C120 and seyfert galaxies NGC 4151 and MCG 8-11-11.

The X-ray luminosity of 3C120 is $(1.1 - 2.3)\cdot10^{44}$ erg/s and the ratio $L_\gamma/L_x = (1 \div 1.5)\cdot10^2$ is in good agreement with similar ratios for seyfert galaxies MCG 8-11-11 and NGC 4151 observed in the region of low-energy gamma-rays /4/ : $L_\gamma / L_x = (6 \div 14)\cdot10^2$ and $(1 \div 5)\cdot10^2$, respectively. Thus the ratio $L_\gamma / L_x \sim 10^2$ might be a characteristic quantity for the objects of such a type.

The gamma-source in the region $l^{II} \simeq 190°$, $b \simeq -20°$ was detected for the first time. Note, that this source is located near the edge of the regions scanned in SAS-II and COS-B experiments. Assuming the energy spectrum of this source (G 190-20) to be power law we calculated power index $\alpha \simeq 2$ and gamma-fluxes for energy range $E_\gamma > 5$ MeV and $E_\gamma > 20$ MeV are presented in the Table. The excess mentioned above cannot be identified with the objects observed in other energy ranges due to insufficient angular resolution of the gamma- telescope, but one should mind that within the indicated region X-ray sources with $J_X \geq 2 \cdot 10^{-6} J_\gamma$ ($E_X = 2 \div 6$ keV)/6/ are absent.

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