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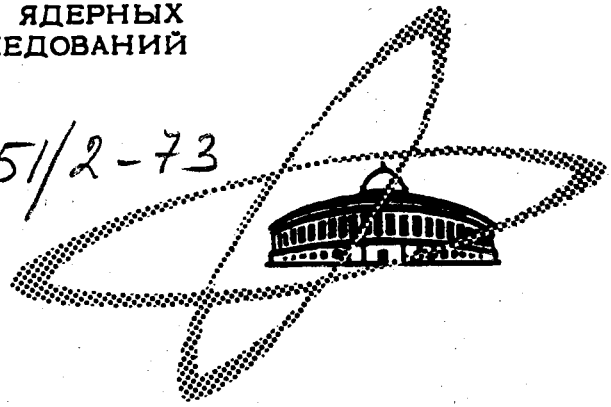

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INELASTIC INTERACTIONS OF PIONS WITH EMULSION NUCLEI AT 60 GEV/C

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INELASTIC INTERACTIONS OF PIONS WITH EMULSION NUCLEI AT 60 GEV/C

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At present the cascade-evaporation model is important for describing the inelastic interactions of particles with nuclei. In Ref.I it was shown that such a model satisfactorily described the known experimental data at energies $T \lesssim 10$ GeV. It is of great interest to investigate the applications of this model at higher energies available in experiments with cosmic rays and at accelerator energies at Serpukhov. We present the results of calculations of various characteristics of secondary particles created in the interactions of pions with light and heavy emulsion nuclei at 60 GeV. The calculations were based on cascade model taking into account the change in nuclear density during the development of cascade. The same scheme of calculations was used as in ref. /2/ .

In figs.I-5 and in Table I the theoretical results and the experimental data are presented. It can be seen that the theoretical and the existing experimental results are in good agreement with one another. Thus, the results based on present calculations and those given in ref. /2/ show the applicability of such a model up to 60 GeV. However, it is very important to make the comparison with a greater number of experimental characteristics. In this connection it is suggested to obtain more experimental data regarding the investigations of secondary shower and grey particles.

Table I

Average Characteristics of Secondary Particles Produced in the Interactions of 60 GeV Pions with Emulsion Nuclei

	CNO		Ag Br	
	Theory	Experiment /3/	Theory	Experiment /3/
$n_s^{\pm}$	7.0	7.4 ± 0.3 8.3 ± 0.9*	12.3	10.2 ± 0.3
$n_{s\pi}$	10.3		16.9	
n_{sN}	0.8		1.6	
$\theta^{o}_{1/2s}$	9.6	8.8 ± 0.8	14.8	16.4 ± 0.6
$P_{\perp s}$, GeV/c	0.44		0.39	
E_{tot}, GeV	5.2		3.0	
$ng^{\pm}$	1.1		5.1	4.1 ± 0.3
$n_{g\pi}$	0.3			
n_{gN}	1.6			
$\theta_{1/2g}$	47.3		55.0	
P_{lg}, GeV/c	0.36		0.32	
E_{kg}, GeV	0.19		0.14	
n_h^*			14.2	10.3 ± 0.3

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* This value corresponds to the average multiplicity obtained in cosmic rays experiments for mean emulsion nuclei (4) at 60 GeV.

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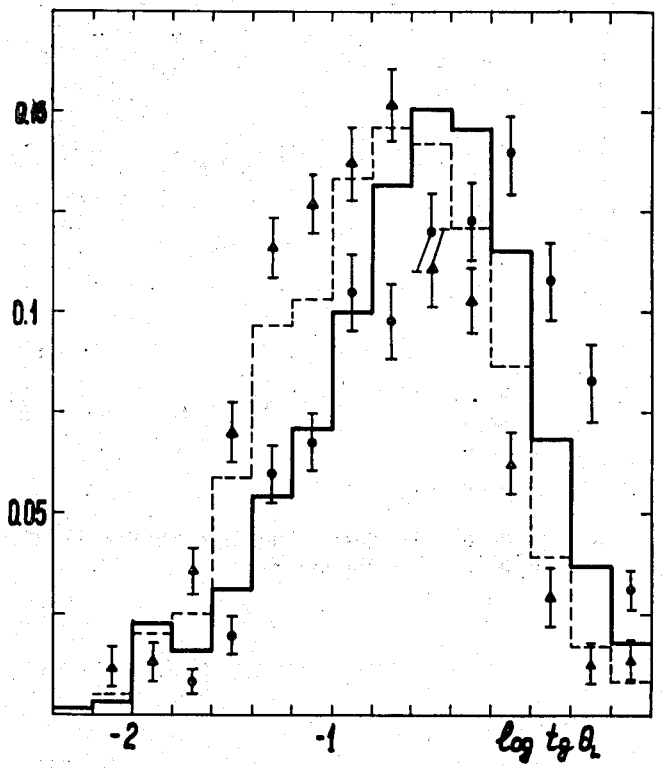

Fig.1. Angular distribution of relativistic particles produced in the interactions of pions with emulsion nuclei. The continuous line and ● show the theoretical and experimental data /3/ for *AgBr* nuclei. The dashed line and ▲ represent the theoretical and experimental data for *CNO* nuclei.

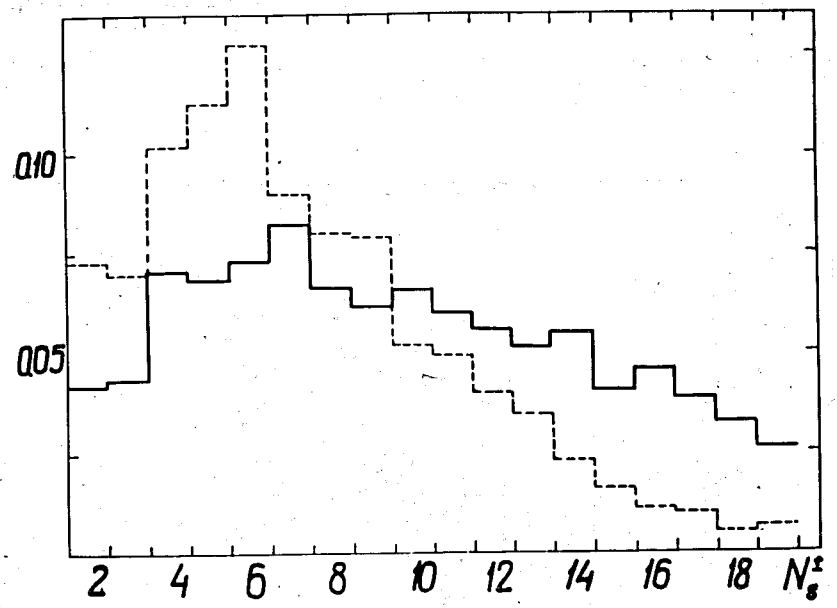

Fig.2. Multiplicity distribution of relativistic particles created in the interactions of pions with heavy (——) and light (-----) emulsion nuclei.

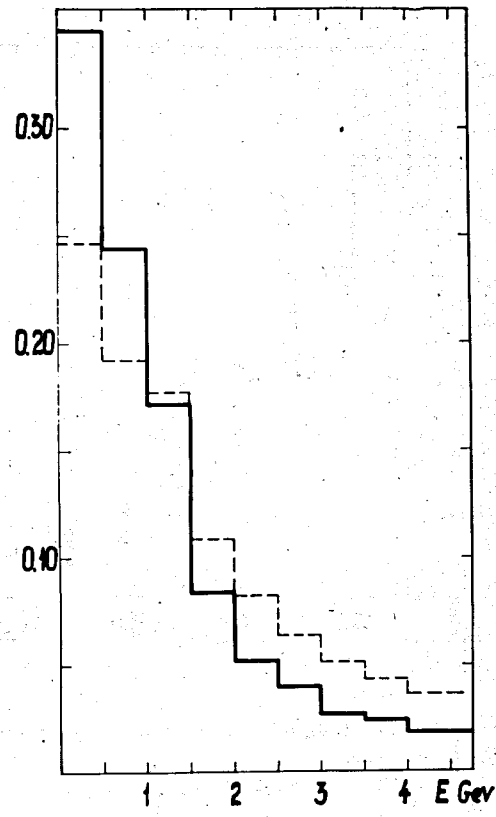

Fig.3. Energy distribution of particles. Notations as in Fig.2.

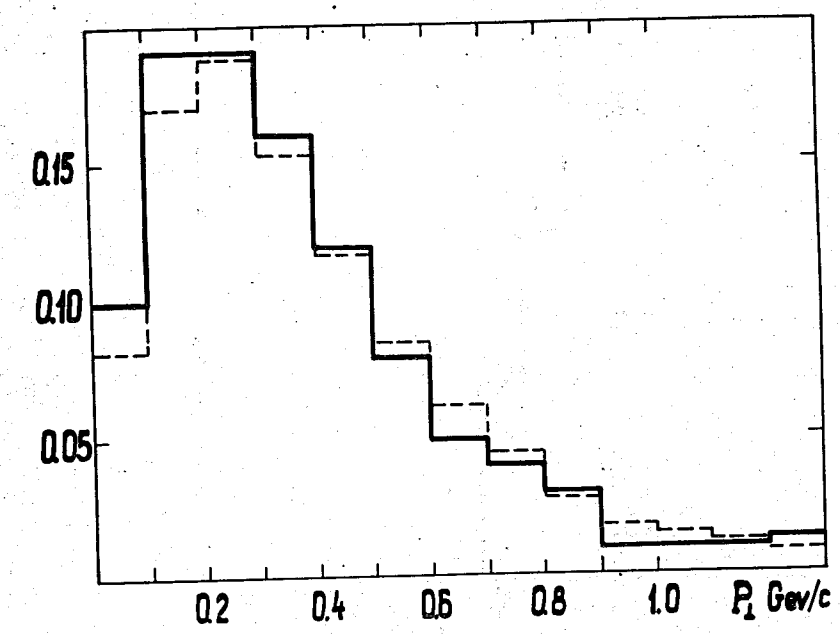

Fig.4. Transverse momentum distribution of secondary particles. Notations as in Fig.2.

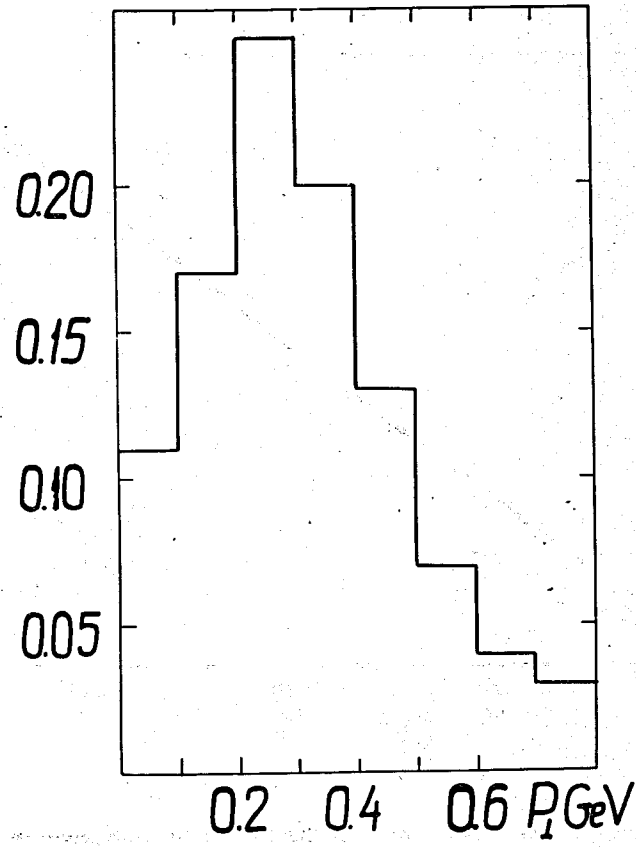

Fig.5. Transverse momentum distribution of cascade particles created in th
of pions with heavy emulsion nuclei.

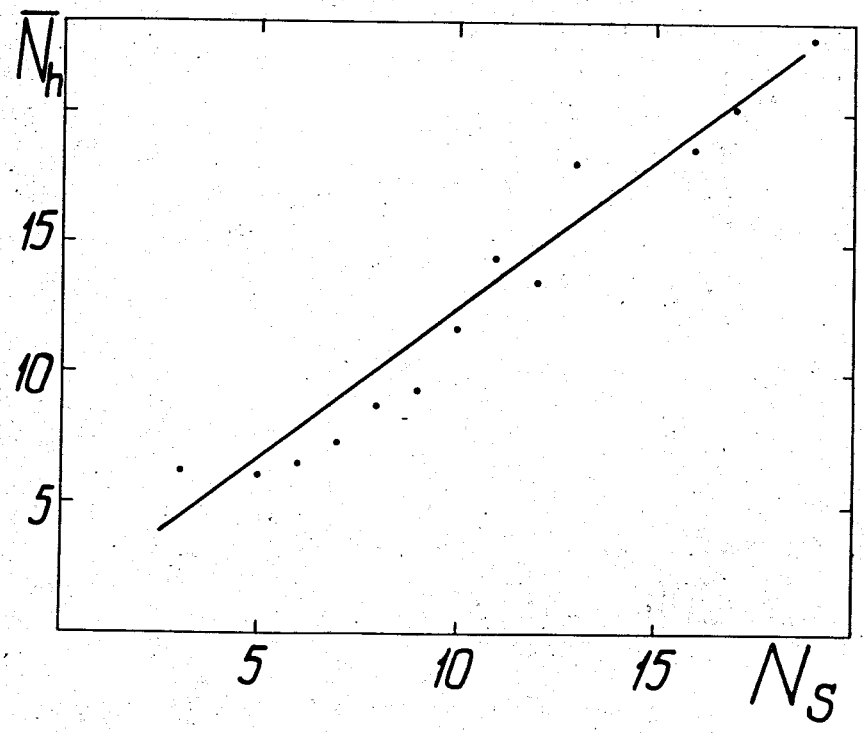

Fig.6. Dependence of $\bar{n}_h$ on n_s in the interactions of pions with heavy emulsion emulsion nuclei. The statistical errors is about 6%.

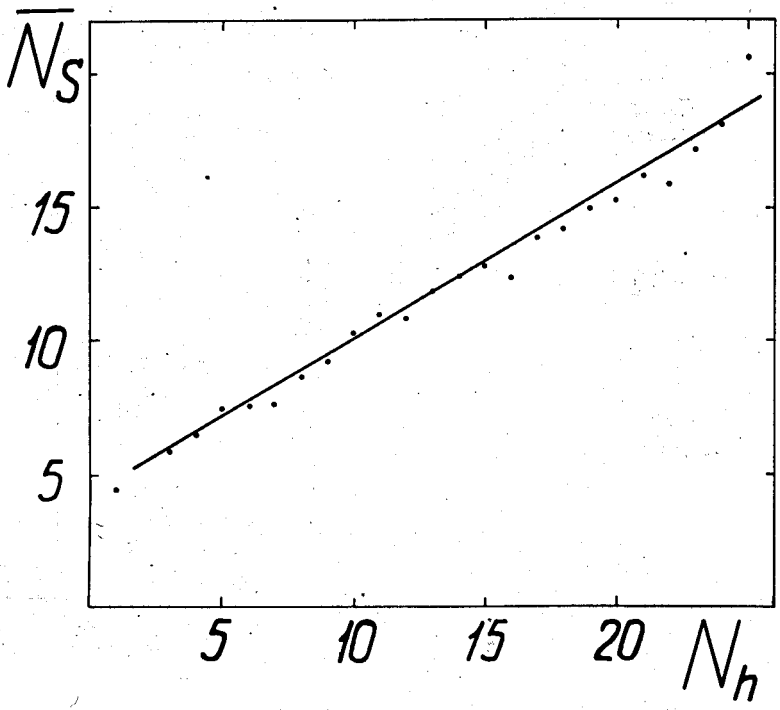

Fig.7. Dependence of $\bar{n}_s$ on n_h in the interactions of pions with heavy emulsion nuclei.

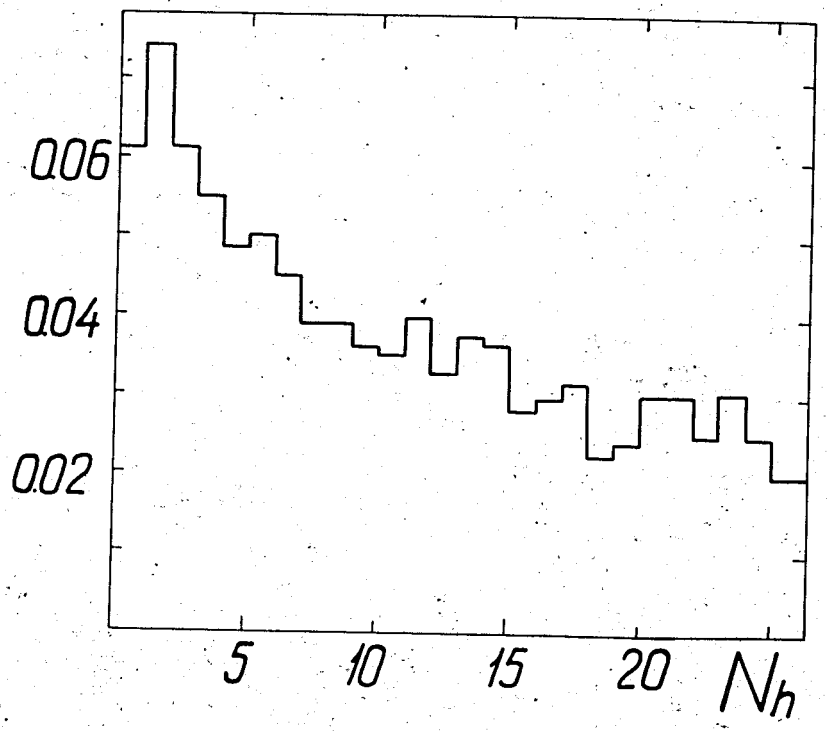

Fig.8. Multiplicity distribution of n_h particles. Notations as in Fig.2.