FEW-PARTICLES GENERATION CHANNELS IN INELASTIC HADRON-NUCLEAR INTERACTIONS AT ENERGY $\simeq$ 400 GeV

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Abstract. On the basis of experimental data obtained at "Tskhra-Tskaro" installation we investigate the behaviour of the few-particles generation channels in interaction of hadrons with nuclei of CH_2, Al, Cu and Pb at mean energy 400 GeV. The values of coherent prodiction cross-sections σ_{coh} at the investigated nuclei are given. A dependence of coherent and noncoherent events is investigated. The obtained results are compared with the simulations on additive quark model (AQM).

The presented data were found experimentally on G.Chikovani mountain cosmic rays station "Tskhra-Tskaro" (atmosphere depch $\simeq$ 760 g/cm^2).

The installation consists of magnetic spark spectrometer and ionizational calorimeter /1/. We've got and analyseal about three thousands of hadron nuclear interactions in CH_2, Al, Cu and Pb targets.

The incoming hadrons flux consisted of 27% of pions and 73% of nucleons /1/. To estimate the multiplicity interval n_s where the contribution of coherent events was the most essential the angular distribution for various intervals were tested by means of dispersional analysis using F-criterion /2/. Such analysis is possible due to more narrow angular distribution of coherent generation particles events comparing with the rest ones. We found that multiplicity interval is equal to: $n_s = 3 \div 5$. On the other intervals n_s the coherent generation event contribution was less than

5%. We must note here that because of different methodical effects the events was $n_s < 3$ were not taken into consideration /1/.

The most simple and generally accepted criterian of coherent production on nuclei processes selection was the criterion /3/:

$$\sum_i \sin\theta_i \leq A^{-1/3}$$

where θ_i is the angle of produced particle.

This criterion is necessary because of the small impulse value transferred to the nucleus target in these processes. The most of multiplicity production events fit this condition as the secondary events distribution becomes more narrow with the increase of primary energy. That's why this background should be taken into account. It can be evaluated starting of com the fact that up to the mean multiplicity the hadron in nucleus interacts only with a nucleon. This can be seen from Fig.1 where we give a probability of fixed multiplicity production n_s on the nucleus as a function of the same probability in pp-interaction. We see that up to $\langle n_s \rangle$ this function doesn't depend on atomic number and is equal to ~ 1. That's why the events, concerning the investigations with only one nucleon which satisfies this criterion were subtracted.

For this we used the data on pp-interaction at energy of 400 GeV /4/ .

The selection results are given in the Table where we also give a full statistics of the observed events.

Table

Nucleus	A full number of interactions	A number of coherent events	A number of nincoherent events	σ_{coh}, mb (n_s=3÷5)
CH_2	589	26	95	9 ± 2
Al	680	27	77	16 ± 3
Cu	1173	50	110	33 ± 5
Pb	457	11	41	40 ± 12

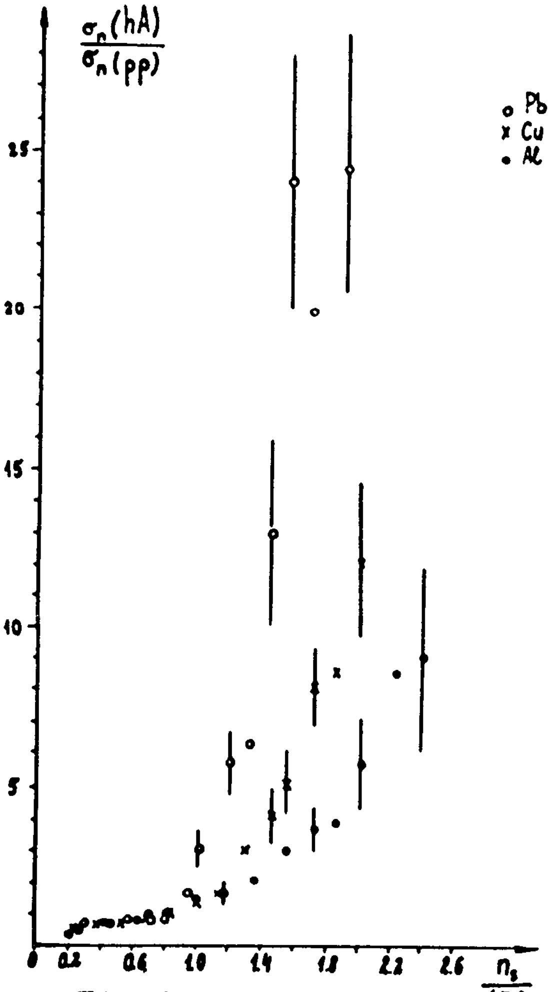

Fig.1

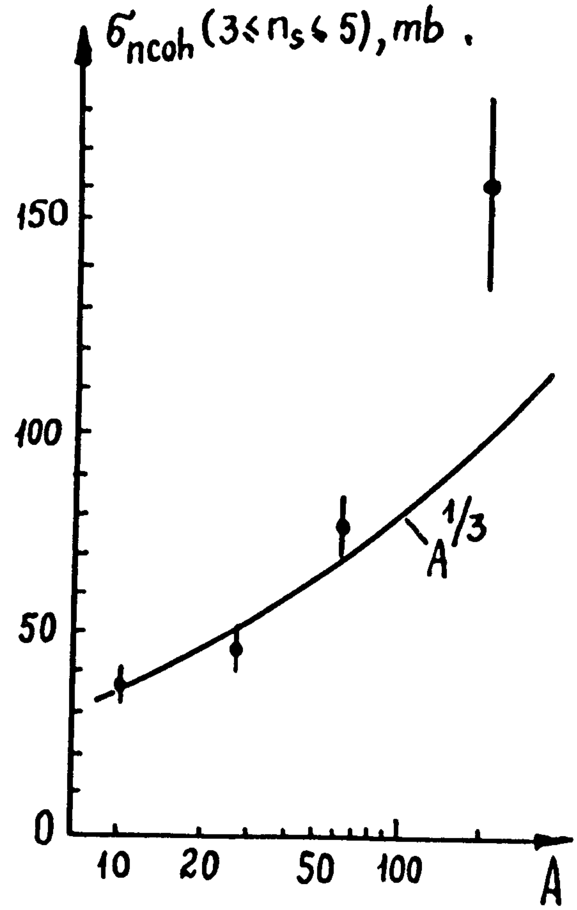

Fig.2

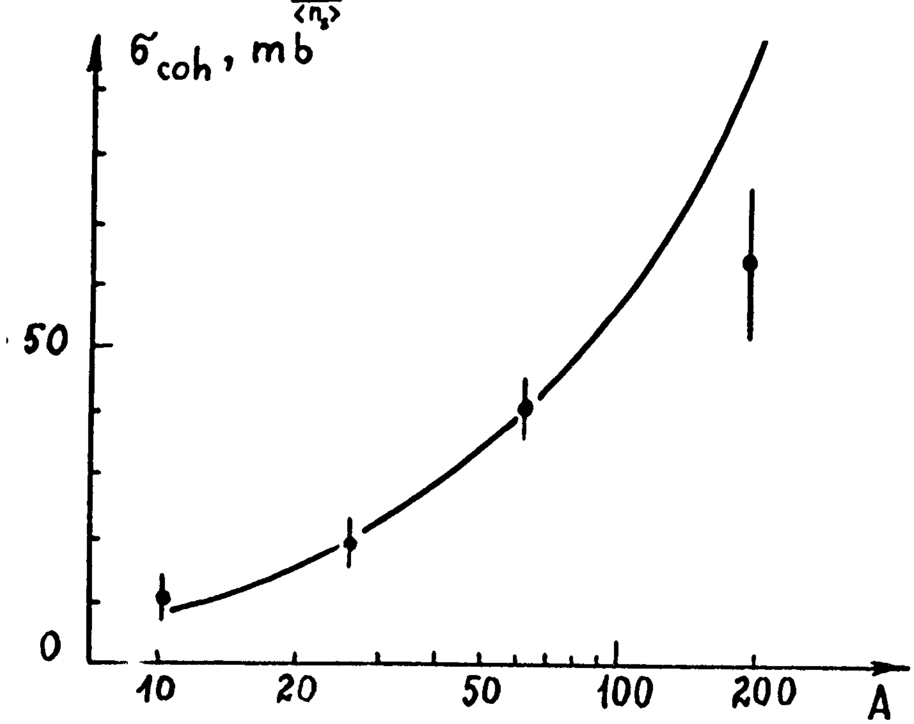

Fig.3

With the help of experimental data for $n_s < 3$ /5/ the received values of $\sigma_{coh}(n_s = 3 \div 5)$ were restored to the full ones and compared with theoretical simulation on additive quark model results /6/ . This comparison is diven in Fig.2. We see that AQM describes light intermediat nuclei rather well, and σ_{coh} isn't in accordence with simulation

On Fig.3 we've plotted the noncoherent events (witch $n_s = 3 \div 5$) depenedevce on atomic number. The curve corresponds to $A^{1/3}$ parametrisation. Such a dependence suggests a particle production at the nucleus edge. It can be seen from Fig. that this suggestion is true for light and intermediate nuclei.

The behaviour on Pb nucleus for coherent and noncoherent processes, evidently, is the consequence of the fact that "passive" quark states on heavy nuclei introduced into AQM manage to transform into active ones. This reduces coherent probability and respectively increases noncoherent events probabily.

References.

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