JOURNAL OF THE PHYSICAL SOCIETY OF JAPAN Vol. 17, SUPPLEMFNT A-III, 1962
INTERNATIONAL CONFERENCE ON COSMIC RAYS AND THE EARTH STORM Part III

III-6-25. Summary of USSR Work*

N. A. DOBROTIN
P. N. Lebedev Institute of Physics, Moscow, USSR

Discussion

Miesowicz, M.: I would like to ask Prof. Dobrotin a question concerning the results of Prof. Grigorov. The problem is of the difference in inelsticity for collisions with light and heavy nuclei. If I remember well Prof. Grigorov has the opinion that in collisions with heavy nuclei the inelasticity is approximately one. There is some discrepancy, I think, with Bristol data. They got the low average inelasticity in Comet stack with lead and number of collisions with heavy nuclei in this stack was rather considerable. Can you add something to this problem?

Dobrotin, N. A.: Yes, my personal feeling, because I am not responsible for this result, is that there is some contradiction with emulsion data but I cannot give you good explanation. Perhaps Dr. Murzin who is in charge of this investigation, will explain this.

Zatsepin, G. T.: The data of Grigorov and Murzin indicate that there is usually secondary interaction after first interaction and energy of second interaction in average is about half of primary, so from their data, it is quite clear that one nuclear active particle is conserved from primary interaction and take half energy of primary particle. I think this must be a nucleon, and in the case of heavy nuclei also the average inelasticity coefficient is about 1/2.

Pinkau, K.: I think that we can reconcile our evidence only in assuming that the inelasticity even in collision with lead is quite small. I don't think one should place too much emphasis on the exact value, but it appears <50%.

Peters, B.: If Dr. Zatespin's explanation of the discrepancy is correct, then it seems to me that if it is a nucleon which makes second collision and dissipates half of energy of primary, it follows that third collision ought to be 1/4, and therefore inelastisity is not as high as 1/2, presumably less than 1/4. Is that correct?

Zatsepin: You are correct.

Powell, C. F.: I think the complication is caused by what you see in these maxima. $\pi^{\pm}$ will in fact behave as the interacting second particle which will contribute to the second and to the later maxima. This is the complication and we have to be careful about the interpretation of energy going to traversing nucleon.

Murzin, V. S.: I don't agree with Dr. Zatsepin on this subject. Our method of determination of inelasticity is that we obtain the energy of π^0 and multiply this coefficient of inelasticity of π^0 by a factor of 3. If there is no other source of gamma ray, then we can multiply by factor 3. And we have two independent ways of measuring π^0 energy. One is this. If we sum up observed ionization depth curves, from this average curve we can obtain average coefficient of inelasticity for π^0 mesons. This is equal to 33% and whole coefficient is about 1. The second way is to measure the coefficient of inelasticity in individual cases and to get distribution of inelasticity. This way gives the average value of 33% too. And it means that the secondary maximum which we can observe in our experiment arise not from nucleons but from π mesons and the additional evidence for this is that there are cases with one maximum which corresponds to transfer of larger part of energy into π^0 mesons.

Peters: It seems to me the factor 3 is applicable in the atmosphere where $\pi^{\pm}$ go

* This article is a summarizing talk of III-6-1, III-6-2, III-6-6, III-6-13, III-6-17 and other Soviet work.

into not-interacting μ-mesons, but in system where the $\pi^{\pm}$ mesons themselves interact, energy which is not in π^0 component continuously contribute to the π^0 component, so it would appear off hand that the factor should be closer to 50% even 60% going into π^0 component of the total amount of the energy and to assume only 1/3 goes to π^0 component does not seem applicable for this type of experiment.

Powell: The argument is that, if I understand it correctly, in the case of such curves as for presented, the total energy of incident particle is given by the total ionization and the fraction going into π^0 meson of the first impact is given by the first peak. If the energy from this is 33%, it is all right.

Koshiba, M.: I am speaking only using a part of ICEF data, and if there may be any mistake some participating laboratories may make the claim. In the interaction of average energy around 10,000 BeV π^0 carries off in the average 16-17% of the total energy. This estimation has been corrected for $\pi^{\pm}$ going into π^0 approximately. Now allowing for the fact that $<P_t>$ is the same for all the component, which we did also confirm in our P_t distribution, and making estimation on charged component, that is mainly π, we can confirm that on the average twice the energy goes into $\pi^{\pm}$ component as that of π^0 component and then we can build a picture, that is, about 50% going to $\pi^{\pm}$ π^0, and say about another 15~20% going to X particle and the rest being carried off by the nucleon.

JOURNAL OF THE PHYSICAL SOCIETY OF JAPAN Vol. 17, SUPPLEMENT A-III, 1962
INTERNATIONAL CONFERENCE ON COSMIC RAYS AND THE EARTH STORM Part III

III-6-26. Large Emulsion Chamber Project at a Mountain Altitude*

Y. FUJIMOTO

Institute for Nuclear Study, University of Tokyo,
Tokyo, Japan

---

* The contents of this article are similar with III-6-16 and the separate manuscript was not provided.