

SOME RECENT COSMOTRON EXPERIMENTS

C. N. YANG

The cosmotron at the Brookhaven National Laboratory, U. S. A. has been working steadily in the last few months, giving a 2.2 Bev proton beam. The regular beam intensity is about 10^{10} protons per pulse and the machine is usually operated at a rate of approximately one pulse every 7 seconds. Besides experiments in connection with operational properties of the machine there are around ten groups of experimental physicists engaged in various experiments using photographic plates, cloud chambers and counters. They have so far been mainly working on heavy meson production, pion-nuclei interaction and high energy neutron interactions.

We would like to report here some recent results on pion-proton total cross-section and on V-meson production.

A) Pion-proton total cross-section. π^+ mesons from a Be target in the primary 2.2 Bev proton beam are first analysed magnetically. Attenuation experiments are done in the analysed beams and total pion-proton cross-sections are obtained from carbon polyethylene differences. The results quoted below are already corrected for muon contamination. Since a high energy π^+ beam is not available at the present moment, the 1.0 and 1.4 Bev π^+ +p cross-sections represent actually the differences of the cross-sections $\pi^+ + D$ and $\pi^+ + p$.

Reaction	Average K. E. of in lab.	Total cross-section	Exp. group
$\pi^- + p$	265 Mev	$46 \pm 16 \times 10^{-27} \text{cm}^2$	Lindenbaum & Yuan
	343	21 ± 11	"
	450	25 ± 3	"
	840	(42 ± 5)	Shapiro et al.
	1.0 Bev	48 ± 6	Cool, Medansky & Piccioni
	1.4	35 ± 3	"
$\pi^+ + p$	210 Mev	93 ± 30	Lindenbaum and Yuan
	280	57 ± 10	"
	340	47 ± 9	"
	450	28 ± 8	"
	1.0 Bev	21 ± 4	Cool, Medansky & Piccioni
	1.4	30 ± 3	"

The high value of the $\pi^- + p$ cross-section at 1.0 Bev is very striking. Remembering that $\pi^- + p$ is two thirds in the isotopic spin $T = \frac{1}{2}$ state and one third in the $T = \frac{3}{2}$ state one concludes that the total cross-section at this energy for the $T = \frac{1}{2}$ state is $62 \times 10^{-27} \text{cm}^2$ as compared with $21 \times 10^{-27} \text{cm}^2$ for the $T = \frac{3}{2}$ state. For comparison we may mention that a full resonance in the $D_{3/2}$ state gives only a cross-section of 24mb. at this energy.

B) V-meson production in $\pi^- + p$ collisions. The cloud chamber group (Fowler, Shutt, Thorndike and Whittemore) has exposed a 18 atm. H_2 diffusion chamber in the focussed 1.5 Bev π^- beam. The chamber is in a magnetic field of 11,000 Gauss. Many V-mesons have been observed. Three of these are produced in Hydrogen. This represents a cross-section for V production in hydrogen higher than $2 \times 10^{-27} \text{cm}^2$. The total cross-section observed is consistent with the counter experiments quoted above. Details of these three and a fourth event in which apparently two V-mesons are simultaneously produced in a π^- -nucleus collision in the chamber wall will be discussed.

c071-013-002

再生紙を使用しております。

$$\underline{\underline{\left(x + \frac{r}{2}\right)\left(x - \frac{r}{2}\right)}}$$

$$H^2 \sum_{n=0}^{\infty} c_n \chi_n = \sum_{n=0}^{\infty} c_n \mu_n^2 \chi_n = \mu^2 \sum_{n=0}^{\infty} c_n \chi_n$$

const. for $\mu^2 = \mu$

$$\left(x + \frac{r}{2}\right) \left(x - \frac{r}{2}\right)$$