Pramāṇa, Vol. 15, No. 3, September 1980, pp. 309–326. © Printed in India.

Momenta and rapidity characteristics of the multiparticle production in 50 GeV/c π^--Emulsion collison

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MS received 13 July 1979; revised 11 August 1980

Abstract. The momenta and rapidity characteristics of the particles produced in 50 GeV/c π^--collision with emulsion nuclei have been studied with an emulsion stack exposed under a pulsed magnetic field. The longitudinal rapidity plots suggest that leading pion is attenuated strongly when passing through a heavy nucleus. The average net charge $\langle N_s^+ - N_s^- \rangle$ produced in the final state of the reaction rises rapidly from a negative to a positive value at $N_h \leqslant 1$ and attains a constant value $\simeq 0{\cdot}60 \pm 0.08$ at all $N_h \geqslant 7$.

Keywords. Multiparticles; proton emission; rapidity; attenuation of the leading pion; parton-model; rescattering effect.

1. Introduction

Since the parton-picture of high energy hadron has been hypothesised by Feynman (1969), multiparticle production in hadron-hadron, hadron-nucleus, lepton-lepton and lepton-nucleus collisions have been extensively studied. The lepton-hadron and hadron-hadron reactions are useful to establish the parton hypothesis while the hadron nucleus and lepton-nucleus reactions help to study the space-time development of hadronic matter. The energy flux cascade model (Gottfried 1973) is one of the initial steps in this direction. In fact, the space-time picture of the hadronic matter is related to the scattering mode of the projectile with the nuclear matter and its energy characteristics after the collision takes place. Due to insufficient experimental data on the leading-particle-effect in hadron-nucleus collision Gottfried (1973) assumed the effect to be the same as in hadron-nucleon* collision, although this does not seem to be true.

The present experiment was designed to study the energy-momenta characteristics of the multiparticles produced in the final state of 50 GeV/c π^--collision with emulsion nuclei. For this purpose an NIKFI-R emulsion stack exposed to a narrow-beam of negative pions in the pulsed magnetic field of strength $\simeq$ 180 KGauss has been used.

*In hadron-nucleon collision the leading particle appears in the final state of the reaction with nearly 50% of the initial momentum and containing internal quantum numbers of the projectile hadron.