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Multiplicities of Forward - Backward Relativistic Charged Particles Produced in ^{32}S-Emulsion Interactions at 200 AGeV/c

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Experimental data on relativistic shower particles emitted in the forward ($\theta_{\text{lab}} < 90$) and backward ($\theta_{\text{lab}} \geq 90$) hemispheres in the interactions of a 200 AGeV/c ^{32}S beam with emulsion nuclei was obtained. The experimental multiplicity distributions (N_s^F, N_s^B) of relativistic shower particles emitted in the forward ($\theta_{\text{lab}} < 90$) and backward ($\theta_{\text{lab}} \geq 90$) hemispheres produced in the interactions of a ^{32}S projectile with CNO, AgBr, and Em are presented and analyzed. The experimental results have been compared with the data generated with the computer code FRITIOF based on the Lund Monte Carlo Model. The FRITIOF model is useful in classifying the particle emission into the forward hemisphere (FHS) and backward hemisphere (BHS). The correlations between the relativistic charged particles emitted in the forward and backward hemispheres have been investigated. The average multiplicities of particles emitted in the forward and backward hemispheres have been studied as a function of the projectile mass number. Also the asymmetry factor ($m = N_s^B - N_s^F$) m-distribution for different grey particle intervals i.e., N_g intervals is studied, and the ratio N_s^F/N_s^B as a function of N_g has been studied to show a Gaussian behaviour. Finally the scaling of the multiplicity distributions of the relativistic shower particles produced in both the forward and backward hemispheres is observed to obey the KNO scaling law.

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I. INTRODUCTION

Most of the experiments on high energy hadron-nucleus and nucleus-nucleus collisions [1–5] were carried out to study the characteristics of multiparticle production, mainly for the forward emitted particles. During the last few years, the production of backward particles at relativistic energies has received considerable experimental and theoretical attention [6–12]. The primary reason for studying the emission of relativistic hadrons from nuclei in the backward direction is that in free nucleon-nucleon collisions such production is kinematically restricted. Emission of relativistic hadrons beyond this kinematic limit may then be evidence for an exotic production mechanism, such as production from clusters [8–10, 13]. Baldin *et al.* [10] argued that simple Fermi motion could not account for such backward hadron emission. They stated that the dominant mechanism for such production was an interaction between the incident nucleons from the projectile and multinucleon clus-

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