Target fragment characteristics emerged in the collision of ^{84}Kr + Em at 1 A GeV

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This article focuses mostly on the emission characteristic of black particles that arise from the interaction of ^{84}Kr + Em at 1 A GeV. For events released in 4π space angle, FHS ($\theta < 90^0$) and BHS ($\theta \geq 90^0$) from various emulsion targets, the association between black and grey particles is investigated. This work shows that the interaction between the projectile and different target nuclei determines the variance between the black and grey particles.

Introduction

During the early days of experimental nuclear and particle physics, nuclear emulsion detector (NED) has had a special role in the investigation of heavy ion interaction [1]. Because of its distinct qualities, NED is still in use today [1-3]. These include its small size, 4π observation capacity, and greatest position resolution. The process of target fragmentation is distinct in the heavy ion interaction compound scheme. A crucial characteristic of heavy ion interaction is that the collision sequence affects the likelihood of releasing events [2-4].

Experimental Details

We used NED with dimensions of 9.8 × 9.8 × 0.06 cm^3 in this observation. They are called NIKFI-BR2 [1,2]. At Darmstadt, Germany's GSI, they were exposed. It is known that the NED contains a combination of H, O, C, N, Ag, and Br in addition to trace amounts of S and I. With the Olympus binocular transmitted light microscope BH-2, we have utilized two commonly used line and volume scanning approaches to identify the physics events from NED plates [3,4]. Based on the characteristics of each class, all events are classified into different categories such as shower, black, and grey particles [1-5]. The combination of grey and black particles are called heavily ionized charged particles and represented by N_h. Based of the N_h values all events are divided into three different groups such as AgBr target group events having N_h more than 8, CNO target group events having N_h in between the range of 2 to 7 , H target group events having N_h 0 or 1 [4].

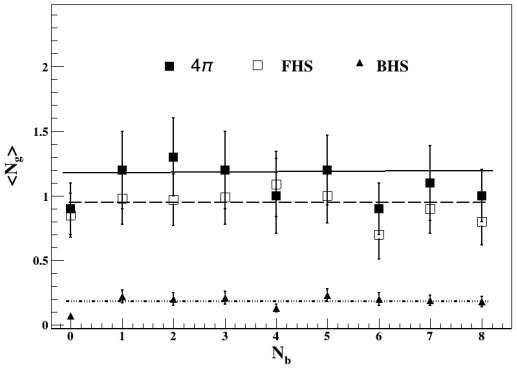

FIG. 1: The events' variations in with N_b occurred from the ^{84}Kr's interactions with the CNO target in 4π space angle, BHS, and FHS [5].

Result and Discussion

For events occurring from collisions of the ^{84}Kr (1 A GeV) with CNO target of NED at 4π space angles, FHS and BHS, Figure 1 shows the change in the mean multiplicity of grey particles compared to the black particles. The mean multiplicities of the grey particles are constant for all levels of black particles, as Figure 1 illustrates. These findings show that

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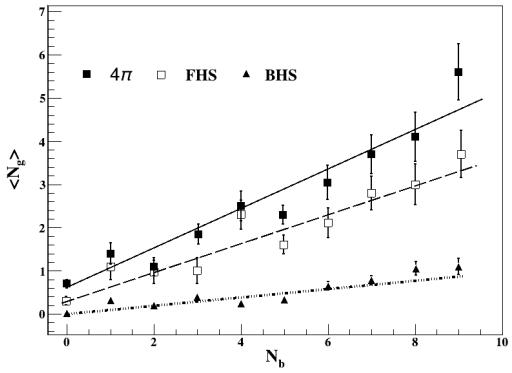

FIG. 2: The events' variations in with N_b occurred from the ^{84}Kr's interactions with the AgBr target in 4π space angle, BHS, and FHS [5].

the production likelihood of grey particles in events caused by the impact of the NED's CNO target is almost constant [5]. The variation in the mean multiplicity of grey particles relative to black particles for events released in 4π space angles, FHS and BHS, is seen in Figure 2. In relation to black particles, Figure 2 clearly shows that the mean multiplicity of grey particles varies linearly in 4 space angle, FHS, and BHS. The BHS has a lower probability of emission than the FHS [5].

Conclusion

The disintegration of the target is a crucial factor in comprehending the interaction between two colliding nuclei, as demonstrated by this research. The current study findings show that the mean multiplicities of the grey particles are linearly connected on the black particles for events arising from interactions with AgBr targets, but not for events produced from CNO targets.

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