Study of multiplicity correlations in nucleus-nucleus interactions at high energy

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INTERNATIONAL JOURNAL OF MODERN PHYSICS E-NUCLEAR PHYSICS
Volume: 24 Issue: 6
Article Number: 1550048
DOI: 10.1142/S0218301315500482
Published: JUN 2015
View Journal Impact

Abstract

In the present paper, some results on the correlations of the nucleus-nucleus interactions, at high energy, between different particle multiplicities are reported. The correlations between the multiplicities of the different charged particles emitted in the interactions of Ne-22 and Si-28 nuclei with emulsion at (4.1-4.5) A GeV/c have been studied. The correlations of the compound multiplicity n(c), defined as the sum of both numbers of the shower particles n(s) and grey particles n(g), have been investigated. The experimental data have been compared with the corresponding theoretical ones, calculated according to the modified cascade evaporation model (MCEM). An agreement has already been fairly obtained between the experimental values and the calculated ones. The dependence of the average compound multiplicity, on the numbers of shower, grey, black and heavy particles is obvious and the values of the slope have been found to be independent of the projectile nucleus. On the other hand, the variation of the average shower, grey, black and heavy particles is found to increase linearly with the compound particles. A strong correlation has been observed between the number of produced shower particles and the number of compound particles. Moreover, the value of the average compound multiplicity is found to increase with the increase of the projectile mass. Finally, an attempt has also been made to study the scaling of the compound multiplicity distribution showing that the compound multiplicity distribution is nearly consistent with the KNO scaling behavior.

Keywords

Author Keywords: Compound multiplicity correlations; nucleus-nucleus interactions; high-energy heavy-ion reaction; nuclear emulsion

KeyWords Plus: HEAVY-ION COLLISIONS; QUANTUM MOLECULAR-DYNAMICS; COMPOUND MULTIPLICITY; INELASTIC INTERACTIONS; 4.5A GEV/C; PHOTOEMULSION NUCLEI; TARGET NUCLEI; EMULSION; MODEL; DISTRIBUTIONS

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Funding

Funding Agency	Grant Number
Deanship of Scientific Research (DSR), King Abdulaziz University, Jeddah	14-965-D1432
DSR	

Citation Network

View funding text

Publisher

WORLD SCIENTIFIC PUBL CO PTE LTD, 5 TOH TUCK LINK, SINGAPORE 596224, SINGAPORE

Categories / Classification

Research Areas: Physics

Web of Science Categories: Physics, Nuclear; Physics, Particles & Fields

Document Information

Document Type: Article

Language: English

Accession Number: WOS:000356805000009

ISSN: 0218-3013

eISSN: 1793-6608

Journal Information

Table of Contents: Current Contents Connect

Impact Factor: Journal Citation Reports

Other Information

IDS Number: CL2VQ

Cited References in Web of Science Core Collection: 59

Times Cited in Web of Science Core Collection: 1