6th Conference on Nuclear and Particle Physics
17-21 Nov. 2007 Luxor, Egypt

ISOSPIN EFFECT OF PROJECTILE FRAGMENTS AND ISOSCALING IN DYNAMICAL AND STATISTICAL MODELS

W. D. Tian, Y. G. Ma, W. Guo, C. W. Ma, G. H. Liu, Q. M. Su, T. Z. Yan, Y. Shi, H. W. Wang, K. Wang, X. Z. Cai, D. Q. Fang

Institute of Applied Physics, Chinese Academy of Sciences, 201800, Shanghai, China

Abstract

The isoscaling properties of the primary and final products are studied via isospin dependent quantum molecular dynamics (IQMD) model and sequential decay model GEMINI respectively, the isoscaling parameter \alpha and \beta of both primary and final products keeps no significant change for the light fragments, but increases with the mass increasing of intermediate and heavy products. The isoscaling dynamical effect is exhibited by that \alpha value decreases a little with the evolution time prolonging, and opposite trend for the heavy products. The isoscaling secondary decay effect is reflected in the increasing of the \alpha value for the final products which have secondary decay process. Furthermore the density dependence of the symmetry energy has also been explored.

Isospin effect of the statistical emission fragments from the equilibrated source is investigated in the frame of statistical binary decay implemented into GEMINI code, isoscaling behavior is observed and the dependences of isoscaling parameters \alpha and \beta on emission fragment size, source size, source isospin asymmetry and excitation energies are studied. Results show that \alpha and \beta neither depends on light fragment size nor on source size. A good linear dependence of \alpha and \beta on the inverse of temperature T is manifested and the relationship of \alpha=4C_sym*delta(Z/A)^2 and \beta=4C_sym*delta(N/A)^2 from different isospin asymmetry sources are satisfied. The symmetry energy coefficient Csym extracted from simulation results is about 23 MeV which includes both the volume and surface term contributions, of which the surface effect seems to play a significant role in the symmetry energy.

Projectile fragmentation products were measured from 50MeV/u 36,40Ar induced reactions on 64Ni, the projectile fragment yields are measured and their yield ratios for different isotopes and isotones are calculated, isoscaling behavior are observed for the light and intermediate mass fragments. The experimental results are compared with the EPAX prediction, Statistical Abrasion-Ablasion model (SAA) calculation and Isospin dependent Quantum Molecular Dynamical (IQMD) simulations.