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Determination of the radial flow in d(4.4 GeV) + Au interaction

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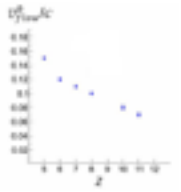
The kinetic energy spectra of intermediate mass fragments, (which are heavier than α-particles but lighter than fission fragments) have been studied for 4.4 GeV d + Au collisions at the Dubna Nuclotron with the FAZA 4π detector array. Experimental kinetic energy spectra were compared to that obtained by the multibody Coulomb trajectory calculations with the various values of radial flow. The analysis has been done on an event by event basis. The multibody Coulomb trajectory calculations of all charged particles have been performed with the initial break-up conditions given by the combined model INC+SMM. It was found good agreement of measured and calculated kinetic energy spectra including additional energy, which is due to the radial expansion of the system. We used a uniform radial expansion, in which the flow velocity is a linear function of the distance of the particle from the center of mass. The velocity of a particle Z located on a radius RZ in freeze out moment was taken as follows:

$$\vec{v}_{flow}(Z) = v^0_{flow} \cdot \frac{\vec{R}_Z}{R_{sys}}$$

v^0_{flow} radial velocity on the surface of the system. The figure shows the dependence of the radial flow v^0_{flow} as a function of fragment charge Z. It is seen that the radial flow decreases with increasing fragment charge. This means that the density distribution is not homogeneous. In fact, if the fragments are formed due to density fluctuations, the formation of heavy fragments is preferable in the denser inner part of the expanding nucleus. The research was supported by Grant No. 15-2-02745-a from Russian Foundation for Basic Research.



Radial flow as a function of fragment charge

Biography

Sergej Avdeyev has his expertise in nuclear physics. He has completed his PhD at the age of 31 years from Joint Institute for Nuclear Research. 2007 – Doctor of Science (Phys. and Math.). He is research team leader focusing on Nuclear multifragmentation at Joint Insitute for Nuclear Research.

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