Influence of the treatment of initialization and mean-field potential on the neutron to proton yield ratios

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- **Criteria for reproducing Woods-Saxon density distribution with gaussian shape density.**

$$a)\ \mathrm{R^{WT}} = \mathrm{R},\ \ b)\ \sigma_r = 0.0156 + 1.7122a$$

point b) cause the initial nucleus unstable, and is not used in the ImQMD model.

- **The same Energy density functional used in the initialization and mean-field propagation:**
  - **Restricted Density Variational method for calculating properties of initial nucleus**

    a)Given the WS density distribution: $\rho_i = \rho_{0i}/(1+\exp(\frac{r-R_i}{a_i})), i = n, p$

    b)The value of ρ_{0n},ρ_{0p}, R_n, R_p, a_n, and a_p are obtained by minimizing the total energy of the system given by,

    $E = \int \mathcal{H} dr = \int \left\{ \frac{\hbar^2}{2m}\left[\tau_n(r) - \tau_p(r)\right] + u_{sky} + u_{md} + u_{coul} \right\} dr$
  - **Updated the mean-field with accurate solution of three-body force term in propagation**

$\frac{\beta}{\eta+1}\sum_i < \frac{\rho^\eta}{\rho_0^\eta} >_i$ ✓ ~~$\frac{\beta}{\eta+1}\sum_i < \frac{\rho^\eta}{\rho_0^\eta} >_i$~~ ×

Figure 1:

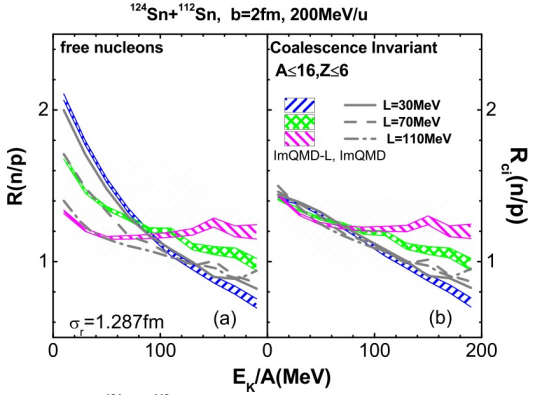
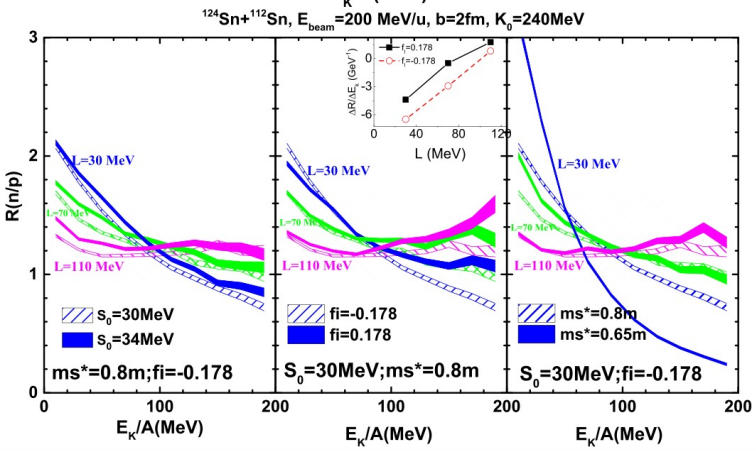


Figure 2:



the R(n/p) in the high kinetic energy region can be used to probe the symmetry energy above the saturation density if f_I is fixed.