Interaction nucleus-nucleus potential (real part)

Interaction potential (IPot) is a complex function depending usually on the distance between colliding nuclei. In the "Radiative capture reaction" section of NRV project the real part of the IPot can be treated in the following forms:

1. **Woods-Saxon (volume)** form:

$$V(r) = \frac{V_0}{1 + \exp\left[\frac{r - R_V}{a_V}\right]},$$

where $V_0 < 0$ is the depth of the potential, $R_V = r_V A_T^{1/3}$ is its radius, A_T is the target mass number, and a_V is the diffuseness of the IPot.

2. **Woods-Saxon (surface)** form:

$$V(r) = -4a_D V_D \frac{d}{dr} \frac{1}{1 + \exp\left[\frac{r - R_D}{a_D}\right]},$$

where $V_D < 0$ is the depth of the potential, $R_D = r_D A_T^{1/3}$ is its radius, and a_D is the diffuseness of the IPot.

3. **Superposition form** is a sum of the volume and surface Woods-Saxon potentials.

4. **Coulomb** potential is treated as the Coulomb interaction of the point-charge and uniformly charged sphere of radius $R_C = r_C A_T^{1/3}$:

$$V_C(r) = Z_1 Z_2 e^2 \begin{cases} \dfrac{1}{r}, & r > R_C, \\ \dfrac{1}{2R_C}\left(3 - \dfrac{r^2}{R_C^2}\right), & r \le R_C. \end{cases}$$