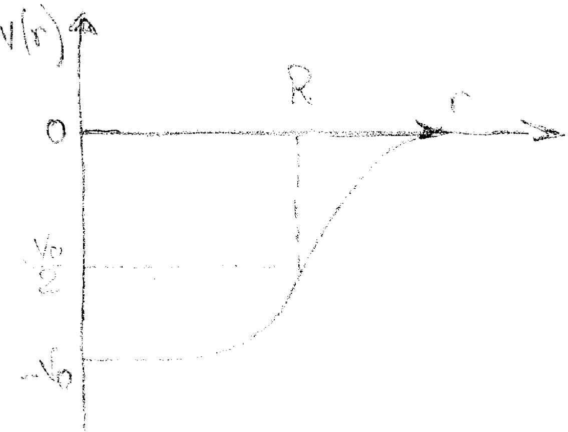
• Potenziale che ha le caratteristiche richieste è quello di Woods-Saxon.

$$V(r) = -\frac{V_0}{1+e^{\left(\frac{r-R}{a}\right)}}$$ 32'



Tipici valori sono:

$V_0 \simeq 50$ MeV $a \simeq 0.5$ fm

$R = r_0 A^{1/3}$ $r_0 \simeq 1.2$ fm

Breve studio di funzione:

$$\lim_{r\to 0} V(r) = -\frac{V_0}{1+e^{-\frac{R}{a}}} \qquad \lim_{r\to\infty} V(r) = 0$$

$$V'(r) = \frac{d}{dr}V(r) = -V_0 \frac{-\frac{1}{a}e^{\frac{r-R}{a}}}{\left(1+e^{\frac{r-R}{a}}\right)^2} \qquad \frac{V_0}{a}\frac{e^{\frac{r-R}{a}}}{\left(1+e^{\frac{r-R}{a}}\right)^2}$$

$V'(r)=0$ for $\lim_{r\to\infty} V'(r)=0$ always positive

$$V''(r) = \frac{V_0}{a}\left(1+e^{\frac{r-R}{a}}\right)^{-4}\left[\frac{1}{a}e^{\frac{r-R}{a}}\left(1+e^{\frac{r-R}{a}}\right)^2 - e^{\frac{r-R}{a}}2\left(1+e^{\frac{r-R}{a}}\right)\frac{1}{a}e^{\frac{r-R}{a}}\right.$$

$V''(r)=0$ if the part in the braket is 0

$$e^{\frac{r-R}{a}}\left(1+e^{\frac{r-R}{a}}\right)^2 = 2e^{2\frac{r-R}{a}}\cancel{\left(1+e^{\frac{r-R}{a}}\right)}$$

$$1+e^{\frac{r-R}{a}} = 2e^{\frac{r-R}{a}} \qquad e^{\frac{r-R}{a}} = 1 \quad \text{per } r=R$$

[illegible]