## Problema (8), Probls. Tema 3

$$n + {}^{99}Tc \longrightarrow {}^{100}Tc + \gamma$$

$$T_n = 10\ eV$$

$$U = -V_0 + iW_0 \quad ; \quad V_0 = 40\ MeV,\ W_0 = 10\ MeV$$

- Justificar onda s:

$$p = \sqrt{2 m_n T_n} = 0.14\ MeV/c$$

$$\lambda\!\!\!^{-} = \frac{\hbar c}{pc} = 1409\ fm$$

$$l = \frac{R}{\lambda\!\!\!^{-}} = \frac{1.25(99^{1/3} + 1^{1/3})\ fm}{1409\ fm} = 0.00499 << 1$$

aprox. $l = 0$

- Sección eficaz

Visto en clase:

$$\eta = e^{-2ik_2R}\,\frac{1 + i\alpha k_2}{1 - i\alpha k_2} \qquad (\text{complejo})$$

donde $\alpha = \dfrac{tg\, k_1 R}{k_1}$ ; $k_1 = \sqrt{\dfrac{2m(E + V_0 + iW_0)}{\hbar^2}}$

($\alpha$: complejo; $k_1$: complejo)

$$k_2 = \sqrt{\frac{2mE}{\hbar^2}} \qquad \text{(real)}$$

$$\sigma_r = \pi \lambda^2 (1 - |\eta|^2) \qquad \text{(real)}$$

Valores numéricos

$E = 10^{-5}$ MeV

$R = 7.03$ fm

$k_1 = (1.3998 + 0.1723\, i)\ \text{fm}^{-1}$

$k_2 = 0.0007$ fm (bajas energías)

$\alpha = (0.158 + 0.609\, i)$ fm

$\eta = 0.999 - 0.00954\, i \quad ; \quad |\eta| = 0.99954$

$1 - |\eta|^2 = 0.00169129$

$$\sigma_r = \pi \cdot (1409)^2 \cdot 0.0016913\ \text{fm}^2 = 10548\ \text{fm}^2 =$$

$$= 105.48\ \text{b.}$$