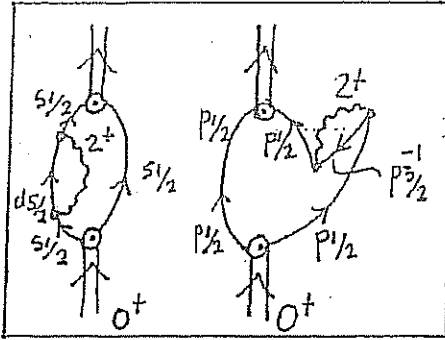


^{11}Li - halo



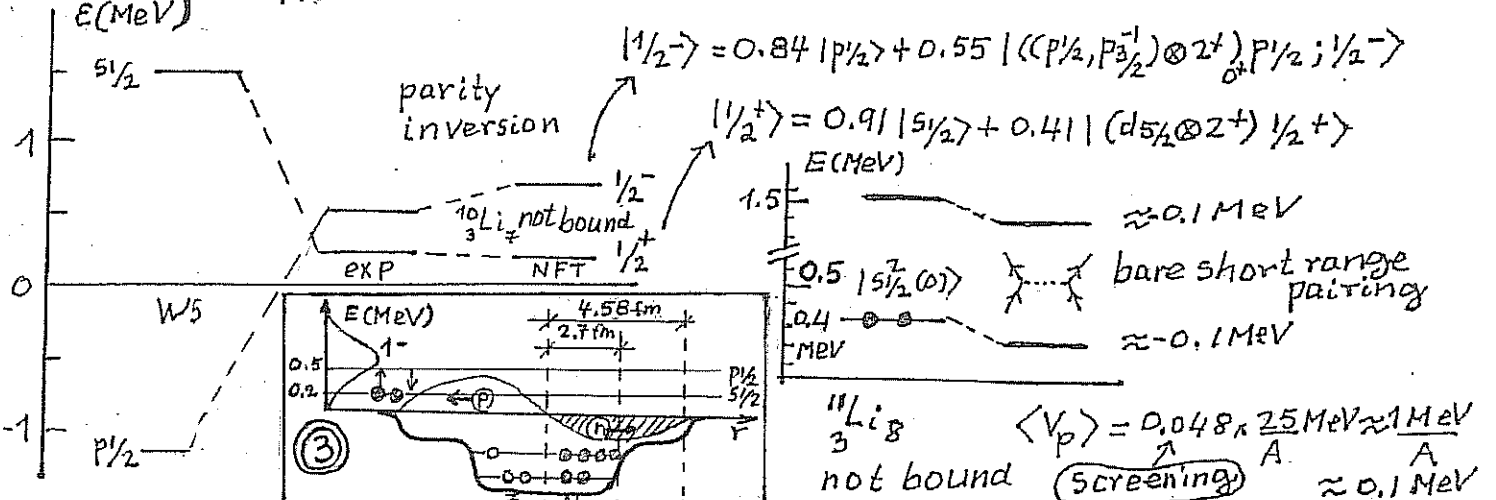
MeV
 $E_{s1/2} = 1.5$
 $E_{p3/2} = 4.7$
 $E_{d5/2} = 3.5$
 $E_{p1/2} = -1.2$

WS potential $R_0 = 1.2 A^{1/3} \text{ fm} = 2.7 \text{ fm}$
 ① $U_0 = V_0 + 0.4 E$ (exchange; Pauli)
 $R(^{11}\text{Li}) = 4.58 \pm 0.13 \text{ fm}$
 $O = \left(\frac{R_0}{R}\right)^3 = \left(\frac{2.7}{4.58}\right)^3 \approx 0.2$
 $m_k = \frac{m}{(1 + O \times 0.4)} \approx \frac{m}{1.08} \approx 0.93 m$

clothing sp $\hbar\omega_{2+}(^9\text{Li}) = 3.3 \text{ MeV}; \beta_2 \approx 0.66$

input $\langle H_0 \rangle = \beta_2 \left\langle \frac{R_0}{\sqrt{5}} \frac{\partial U}{\partial r} \right\rangle O \approx 0.66 \left(-\frac{50 \times 0.2 \text{ MeV}}{\sqrt{5}} \right) \approx -3 \text{ MeV}$

② diagonalization
 $\begin{pmatrix} (6.8 - \lambda) & -3 \\ -3 & (1.5 - \lambda) \end{pmatrix} = 0$
 $\begin{pmatrix} (-3.8 - \lambda) & -3 \\ -3 & (-1.2 - \lambda) \end{pmatrix} = 0$
 $\tilde{E}_{s1/2} = 0.15 \text{ MeV}$
 $\tilde{E}_{p1/2} = 0.77 \text{ MeV}$



halo-anti pairing effect sp at threshold

$H_D = K_1 \vec{D} \cdot \vec{D}^+$
 $K_1 = 5 K_1^0$; $K_1^0 \sim 5 V_1 = 165 \text{ MeV}$
 $K_1 \sim 12 \text{ MeV}$ ($s \approx 0.07$)
 $\hbar\omega_{\text{pigmy}} = ((E_{1/2^+} - E_{1/2^-})^2 + K_1 (2 \times 0.05 \text{ TRK})^2)^{1/2} \approx 0.8 \text{ MeV}$
 $\Lambda^2 \approx 0.4 \text{ MeV}^2$

$\Lambda = 0.62 \text{ MeV}$
 clothed sp states
 pigmy
 $\Delta E_{\text{ind}} \approx -0.95 \text{ MeV}$
 $\Delta E = 0.1 \text{ MeV}$
 WS + clothing sp
 $E_{\text{corr}} \approx |2\tilde{E}_{s1/2} + \Delta E_b + \Delta E_{\text{ind}}| = |0.4 - 0.1 - 0.95| \text{ MeV} \approx 0.7 \text{ MeV}$
 $(E_{\text{corr}})_{\text{exp}} \approx 0.380 \text{ MeV}$
 $|\tilde{0}^+\rangle = |0\rangle_v + 0.7 |(p_{1/2}, p_{3/2}^{-1})_{1^-}; 0\rangle + 0.1 |s_{1/2}, d_{5/2}\rangle_{2^+}; 0\rangle$
 $|\tilde{0}^+\rangle = |0\rangle_v = 0.45 |s_{1/2}^2(0)\rangle + 0.55 |p_{1/2}^2(0)\rangle + 0.04 |d_{5/2}^2(0)\rangle$

