For deuteron \( W = 2.22 \text{ MeV} \ll V_0 \)

\[ V = \frac{\sqrt{m_0 V_0}}{\hbar} \quad \text{or} \quad \kappa a = -\frac{\hbar}{V} = -\frac{\sqrt{V}}{V_0} \]

\( a \) in slightly larger than \( \frac{\hbar}{2} \)

\[ c = \frac{1}{e^{r/r_0}} u(r) \]

64) **Scattering Length**

Interaction between proton and neutron is more attractive when the spins are parallel (Spin-triplet state)

The spin singlet state is not bound

Let us now consider the wave function for \( E > 0 \).

This is a scattering wave function \( u(r) = \sin \left( kr + \phi \right) \)

(We consider only \( l = 0 \) scattering)

\( \Rightarrow \) wave function is radially symmetric

At low energies \( kr + \phi \ll 1 \), \( u(r) = kr + \phi \)