\[ D = -\frac{\pi^4}{3} \beta \nu \frac{2}{a} \left( \frac{d}{\beta} \right) \]

\[ = -\frac{\pi^4}{3} \beta \nu \left( \frac{\nu E_x}{\beta} \right)^2 = -\frac{12}{\pi^4} E_x^2 \]

\[ 2\pi \sqrt{-\nu} = 2\pi \sqrt{2\nu} \frac{E_x}{\beta} = \sqrt{4\nu} E_x \]

\[ \Rightarrow \beta (E) = \frac{1}{\sqrt{8\beta E_x}} \frac{2}{\sqrt{\pi^4}} \sqrt{g(2\nu)E_x} \]

### (d) Empirical Mass Formula

In this section, we discuss a formula for the binding energy of a nucleus.

- **Main term**
  \[ E_B(2\nu, X) = 24A \]

- All nucleons are inside an attractive potential.

- Nucleons near the surface are less strongly bound: The number of nucleons near the surface in \( A^{2/3} \) is

\[ \Rightarrow E_B(2\nu, X) = 24A - 22 A^{2/3} \]

Then we have the Coulomb energy:

\[ E_C = \frac{2(2-1)}{2} \frac{1}{R} \frac{2(2-1)}{2} \frac{1}{R} \]

\[ R \sim A^{1/3} \]

Also, this term is repulsive.