<Act 1st 1/2 life> : $A = \frac{N_0 \ln 2}{\ln(2)/\lambda} = \frac{N_0 \lambda}{2\ln(2)}$

Units decay [1 Bq = 1 decay s^{-1}
1 Curie = 3.7×10^{10} decay s^{-1}]

6. Unif of Forces

intrinsic strength ↘ range

Particle mot°: $\psi = e^{ikx}$, $k = \frac{p}{\hbar}$

wavefield mot° only "sees" obj size $x \leq a$

de Broglie wavelength + Special relativity ℰ

$\lambda_B = \frac{\hbar}{p}$ ⇓ $\mathcal{E}^2 = (pc)^2 + (m_0 c^2)^2$ $= m_0 c^2 + kE$

i extreme relat case !

$\lambda_D = \frac{\hbar c}{kE}$, $kE >> m_0 c^2$

Range F by exchange particle : $\rho = \frac{\hbar c}{E_0}$

$kE \geq E_0$	$kE \leq E_0$	$kE > 90$ GeV
large °G int	weak int	weak F
$\frac{\hbar c}{kE} \leq \frac{\hbar c}{E_0}$ ↱	really weak	strong = E.M F
	$W \sim 90$ GeV	

⇒ UNIFICAT° (at lower energies broken)

[1/40 eV = 300k
100 GeV = 10^{15} k]

B(Z,N) light nuclei : → increase to ~8 MeV/nucleon (negligible binding E e⁻ e⁻)
→ large for even-even nuclei
→ B(Z,N) but nucleon fluctuats

B/A MeV

A

: deviat° (<1%) from formula are caused by shell effects

11. Radioactive decay

decay occurs when rest mass nucleus > total rest mass products

Energy released $Q = (\text{mass of nucleus} - \text{mass of products})c^2$
↳ as kE or heat

Main decay modes : β, α, fission, γ

β^- decay : $Z \to Z+1$
β^+ decay : $Z \to Z-1$
k-capture : $Z \to Z-1$

- weak int
- A (mass n°) conserved
- β^- can occur in free space
- all are observed in nuclei
- β^- & β^+ : can observe E of emitted $e^\pm$

$n e^-$ → E_{max} particle E

$n e^+$ → particle E

E released per react° is fixed & shared btw e & ν_e