

Heisenberg

$$\Delta p \Delta x \geq \frac{\hbar}{2}$$

$$|\Delta E \cdot \Delta t| \geq \frac{\hbar}{2}$$

$$P_{\text{decay}} = \lambda dt$$

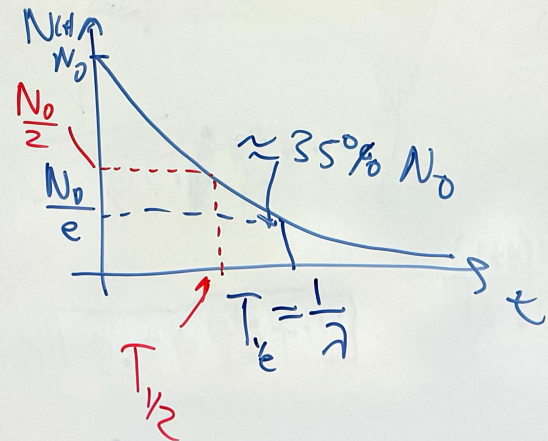
$$dN = -N \cdot \lambda dt \rightarrow \dot{N} = -\lambda N$$

$\uparrow$ Parent $\uparrow$ wait
 $\uparrow$ # nuclei $\uparrow$ decay constant

$$N(t) = N_0 \cdot e^{-\lambda t}$$

$$\frac{dN}{dt} = -\lambda N_0 e^{-\lambda t}$$

(Ratio) activity



$$dN_{\text{daughter}} = -dN_p = N_p \lambda_p dt$$

$$+ dN_d^{\text{decay}} = -N_d \lambda_d dt$$

$$\frac{dN_{\text{daughter}}}{dt} = N_p \lambda_p - N_d \lambda_d$$

$$e^{-\lambda T_{1/2}} = \frac{1}{2}$$

$$\lambda T_{1/2} = \ln 2$$

$$T_{1/2} = \ln 2 \cdot \frac{1}{\lambda} = \ln 2 \cdot T_{1/\lambda}$$

$$\lambda = \frac{\ln 2}{T_{1/2}}$$