$$\vec{\nabla}\cdot\vec{E} = \frac{\rho}{\varepsilon_0} \qquad \vec{\nabla}\cdot\vec{B} = 0$$

$$\vec{\nabla}\times\vec{E} = -\frac{\partial\vec{B}}{\partial t} \qquad \vec{\nabla}\times\vec{B} = \mu_0\vec{J} + \mu_0\varepsilon_0\frac{\partial\vec{E}}{\partial t}$$

$$\left(\nabla^2 - \frac{1}{v^2}\frac{\partial^2}{\partial t^2}\right)\begin{pmatrix}\vec{E}\\ \vec{B}\end{pmatrix} = \emptyset$$

$$\vec{E} = \vec{E}(\vec{x},t) \qquad \vec{B} = \vec{B}(\vec{x},t)$$

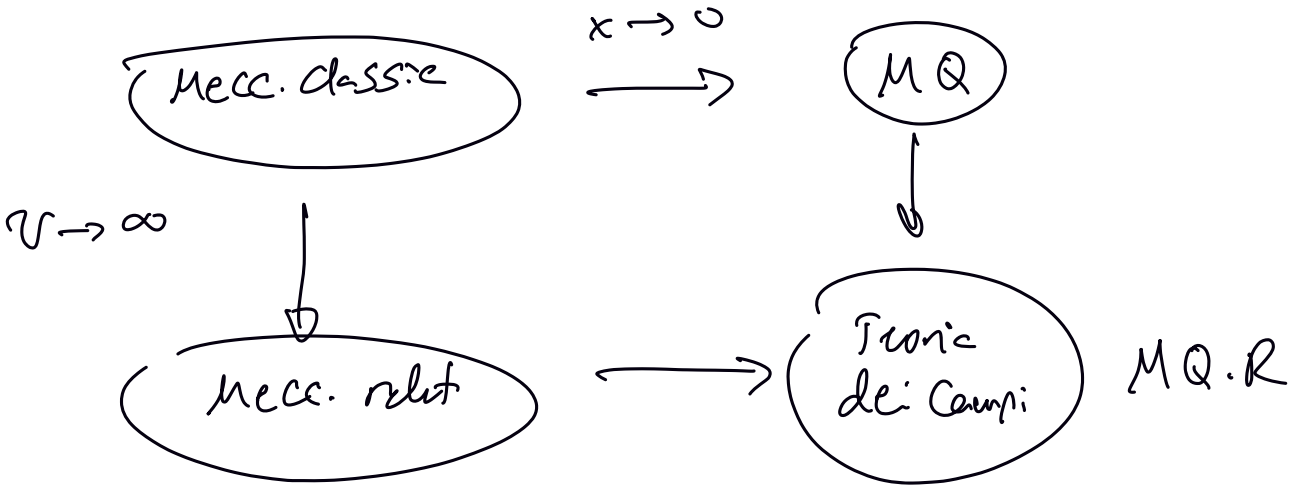
Crisi

1) corpo nero
   foto elettrico $\Rightarrow$ MQ

2) etere $\Rightarrow$ rel. ristretta

3) orbita di Mercurio $\Rightarrow$ rel. generale

4) radioattività nuove radiazioni α, β, γ



1) Studio dei sistemi legati $\Rightarrow$ Struttura della materia
   spettri ottica

2) urti fra particelle $a + b \to \begin{matrix} a + b \\ c + d \end{matrix}$ } FNSN

3) Decadimento

ψ $\quad -i\hbar \frac{\partial}{\partial t} \psi(\vec{x},t) = H\psi(\vec{x},t)$

$|\psi,t\rangle = |\psi,t=0\rangle \; e^{-iEt}$

$|\langle \psi,t|\psi,t\rangle|^2 = |\langle \psi,0|\psi,0\rangle|^2 = 1$

$\mathcal{O} \qquad \langle \psi,t|\mathcal{O}|\psi,t\rangle$

Decadimento $\quad a \longrightarrow b + c$

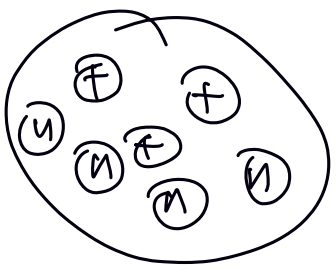
$${}^{A}_{Z}N \longrightarrow {}^{A-4}_{Z-2}N' + \alpha$$

Interazioni fondamentali:

- EM
- interazione debole
- interazione forte

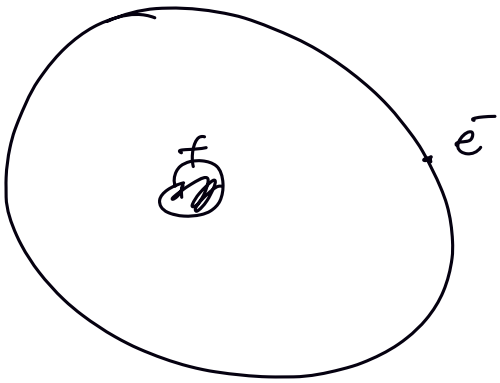
Z: # elettroni == # protoni

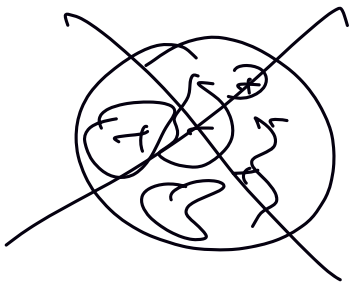
A: numero di massa, numero di nucleoni.



$^{4}_{2}He$

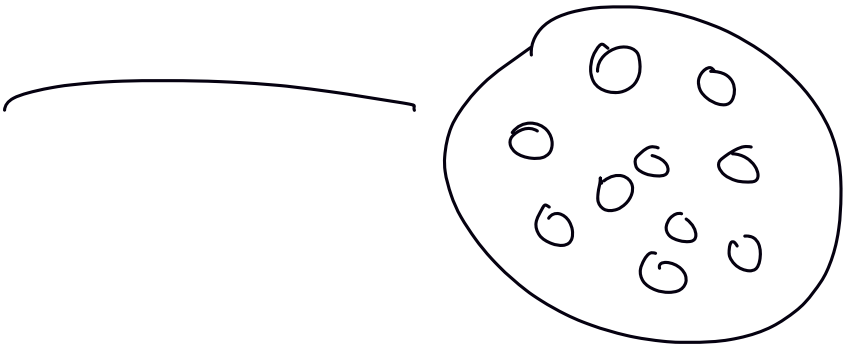
2 protoni
2 neutroni





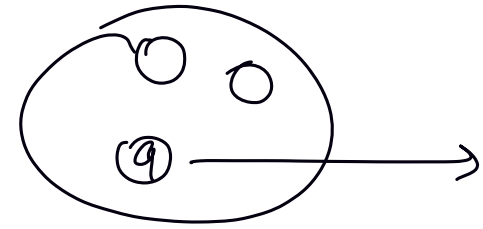
EAR ≃ 60 km ⇒ 10 km.

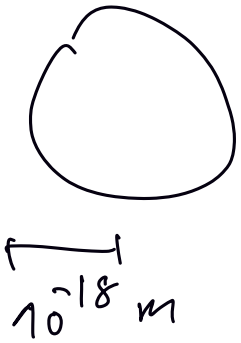
$10^{-10} \times 10^{4}$ m = 1 μm.



10^{-15} m = fm

1 protone





particelle puntiforme o elementare

variazione di energia solo cinetica

$$\Delta p \cdot \Delta x \simeq \hbar$$

$\hbar = 1 \rightarrow \quad \Delta x \simeq 1$ fm.

$p \simeq 200 \times 10^6$ eV

$\lambda \simeq 400 - 700$ nm