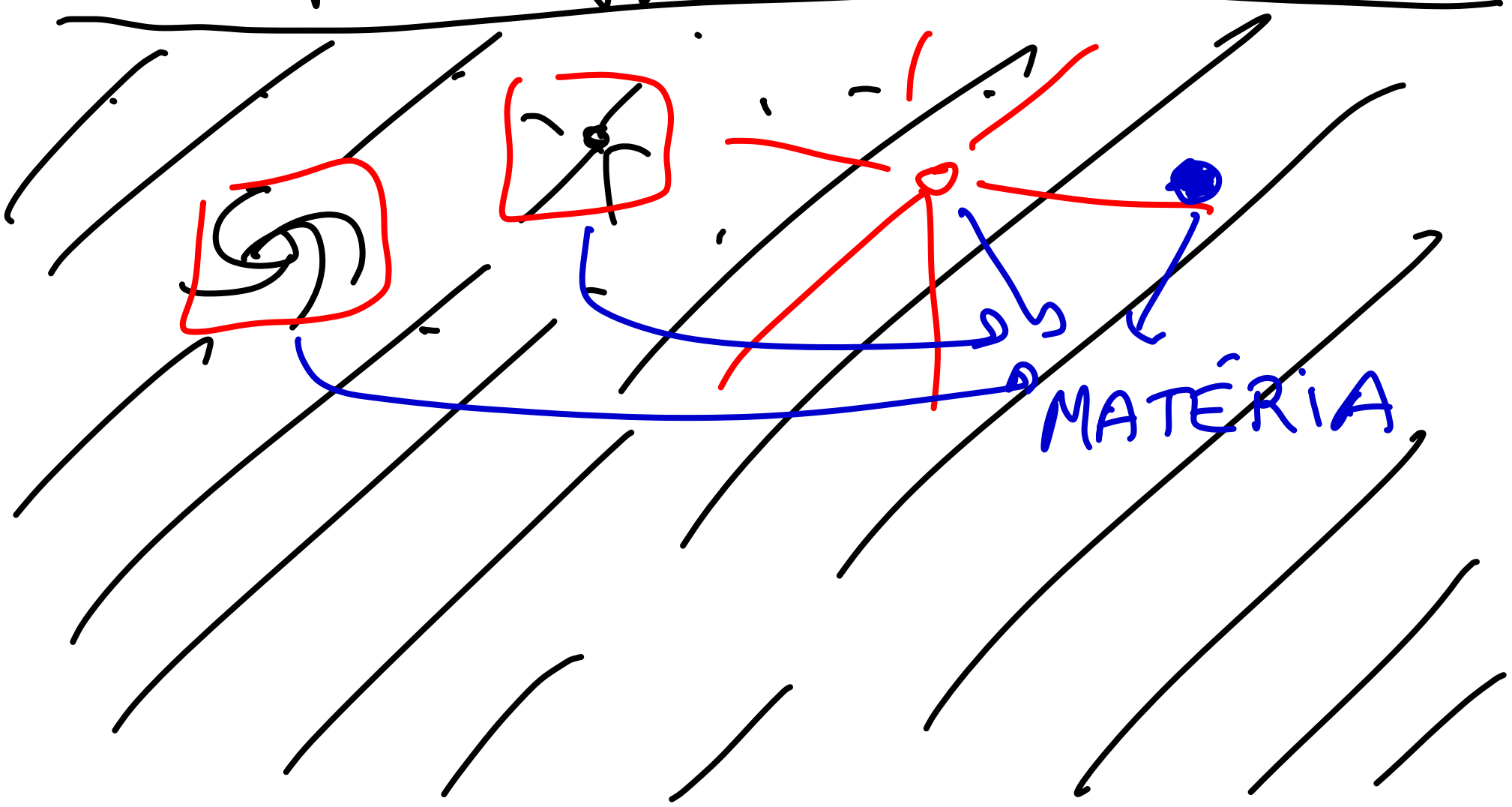
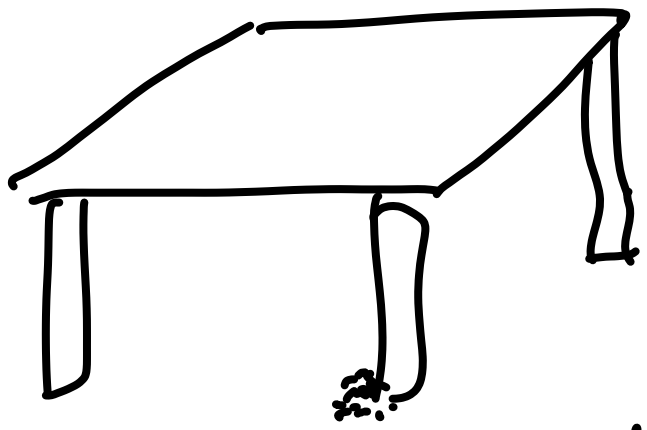
BOA TARDE!

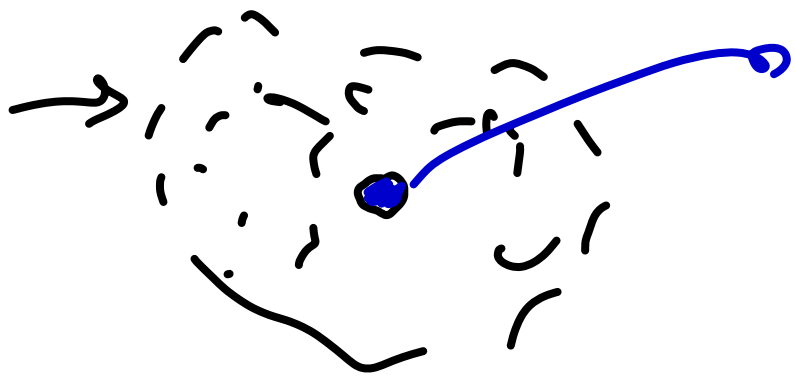
- De que é que somos feitos?
- Do Universo aos quarks e leptões e bosões e pessoas e coisas e...

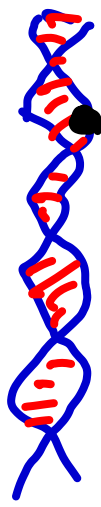
(campo de Higgs)





↳ bocados de mesa → células de madeira



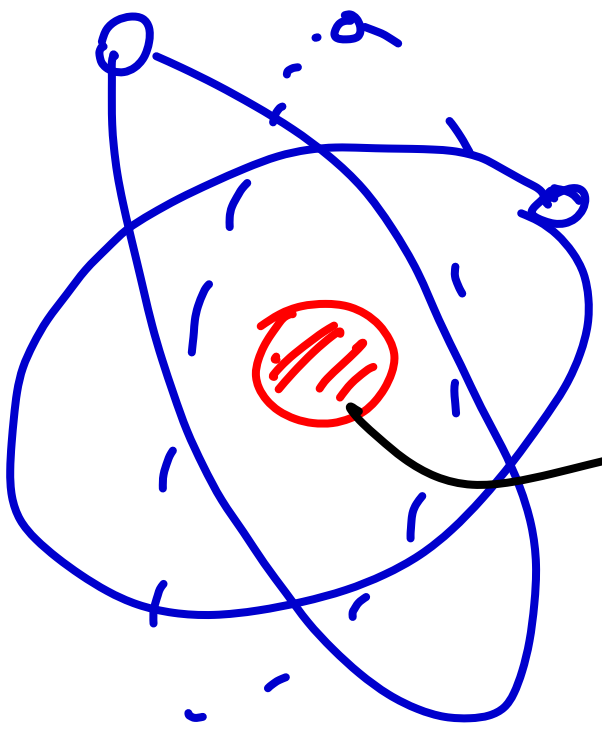


DNA

→ A - Adenina

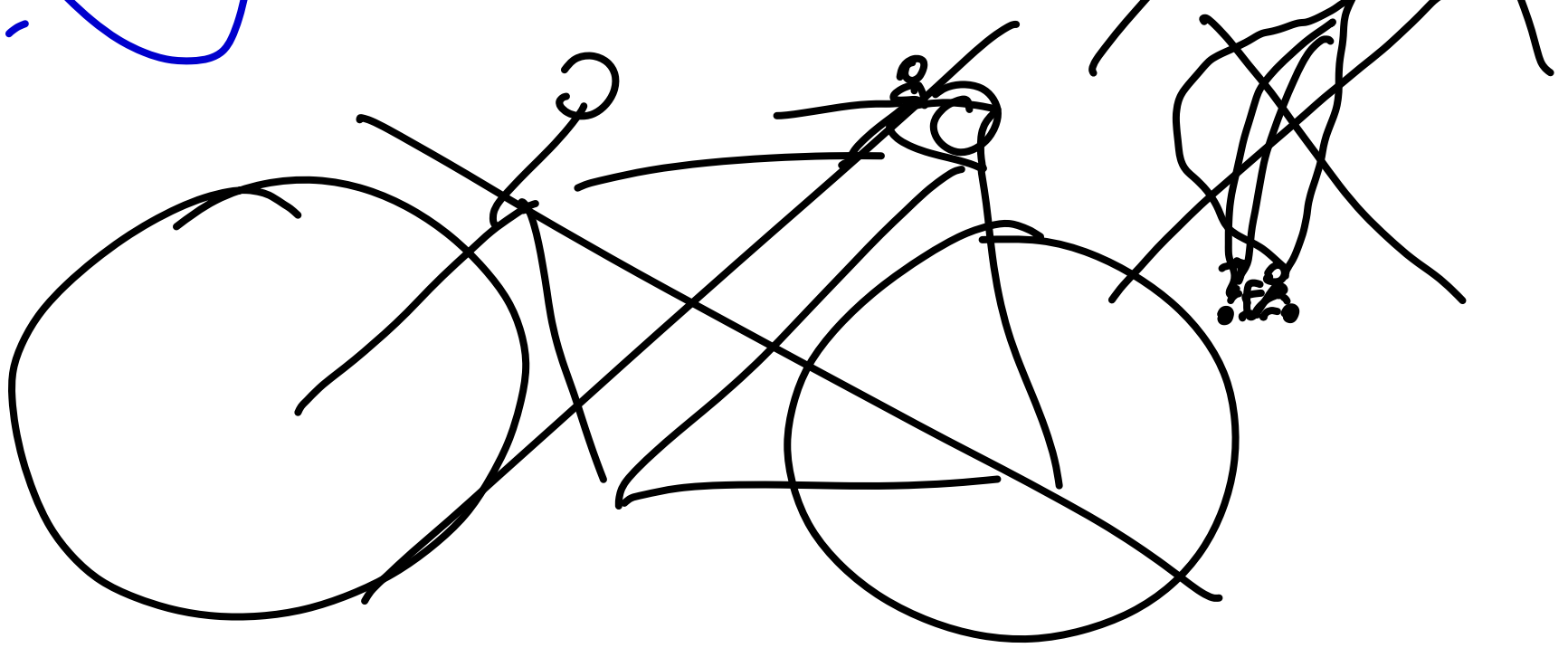
↳ C - H - N

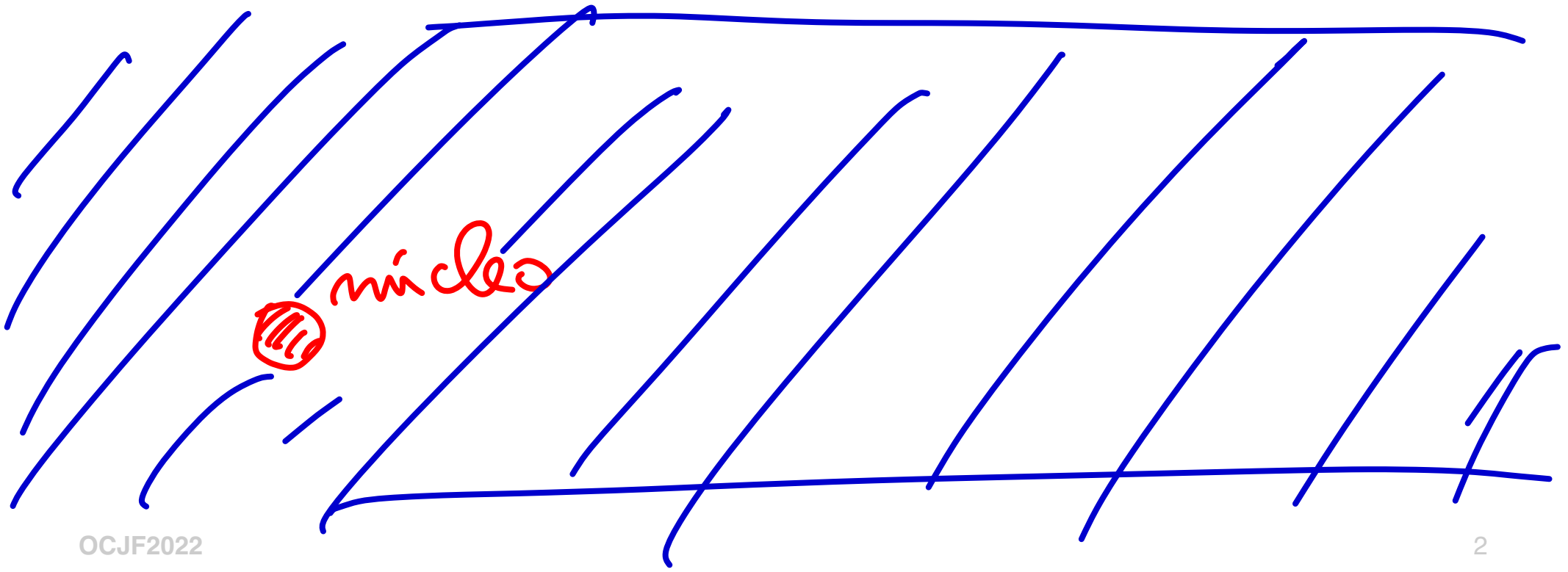
Átomos



→ eletrões

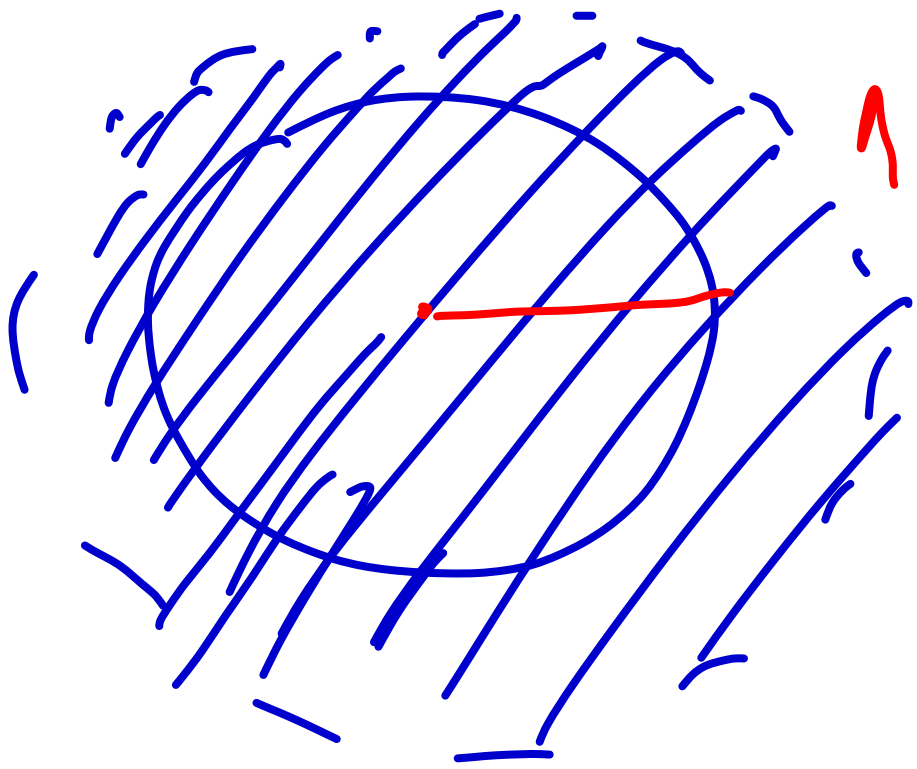
núcleos





núcleo <<< átomo

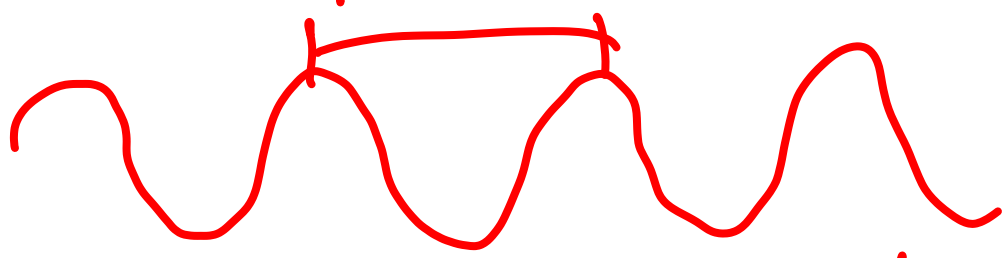
$$R_{Núcleo} \simeq \frac{R_{átomo}}{100000}$$



10^{-10} m

ondas

comprimento de onda



λ (lambda)

λ << dimensões do objeto

↑ luz visível → λ: $\sim 10^{-7}$ m

Raio-X: $\lambda \sim 10^{-9} \rightarrow 10^{-18}$ m

raios gama: $10^{-15} \rightarrow$ ....

por mal

De Broglie: 1924

$$\lambda = \frac{h}{p}$$ → momento linear ("$p = mv$")

$h = n^{o} = 6{,}626 \times 10^{-34}$ (J.s)

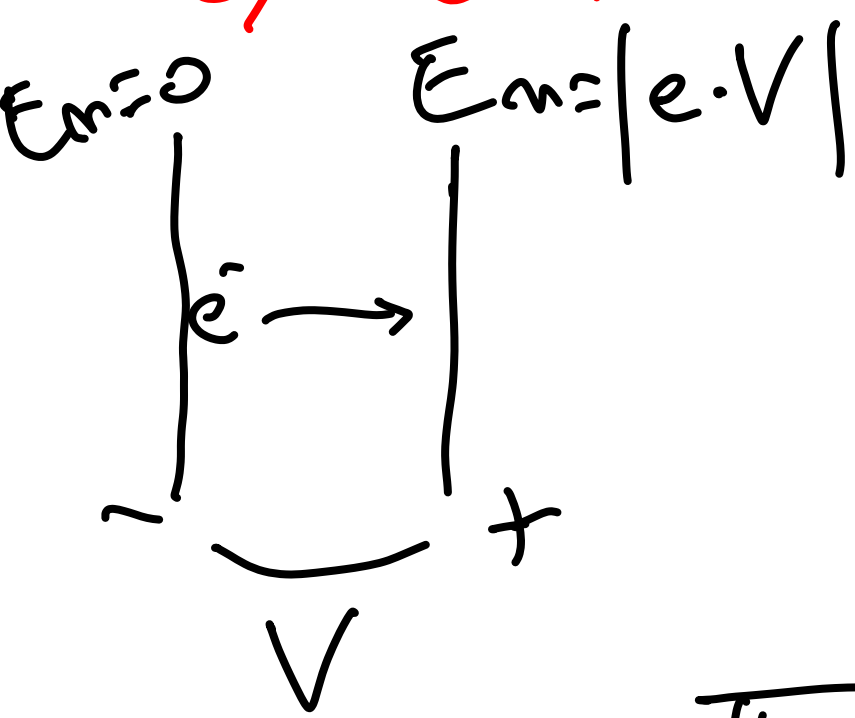
Constante de Planck

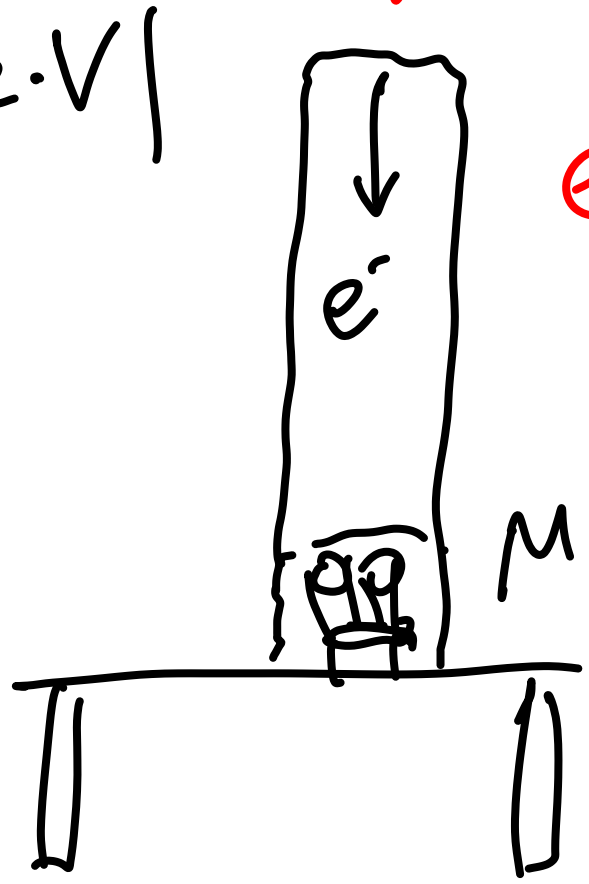
$$E = \frac{hc}{\lambda}$$ 1900

c/ eletrões: $\vec{F} = -e\vec{E}$

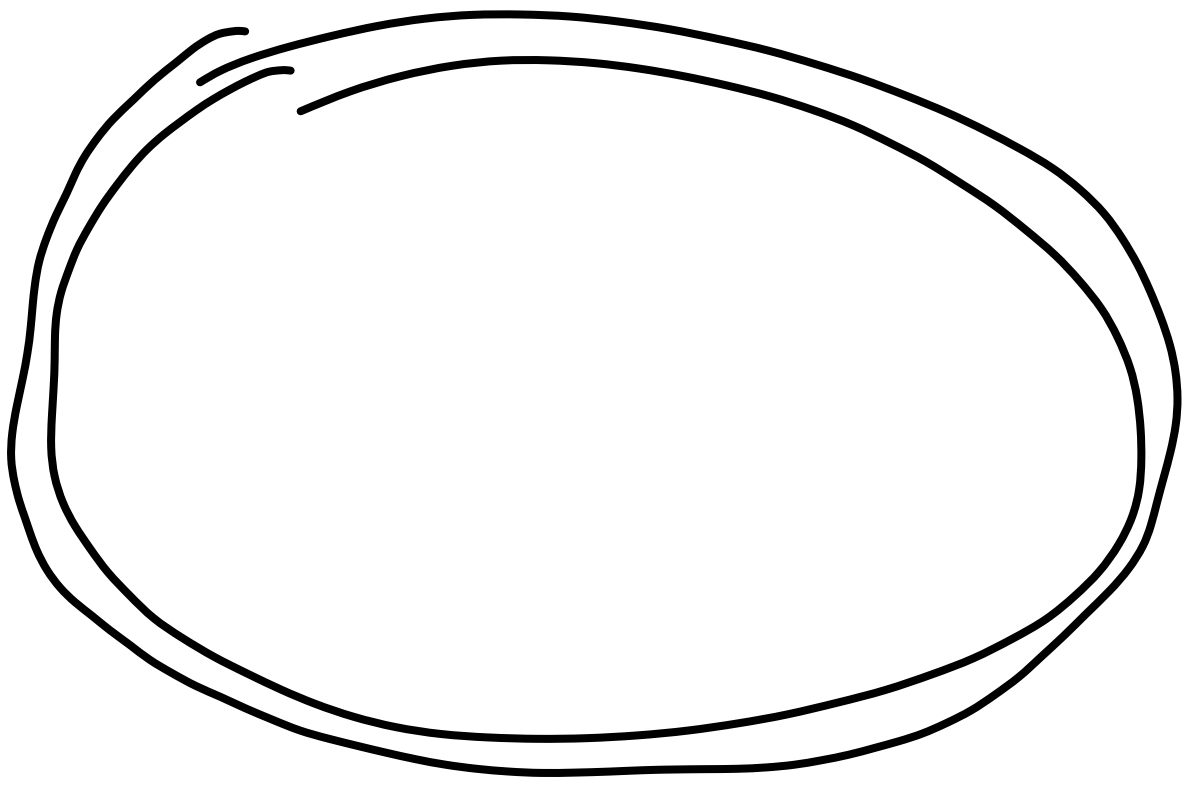
↑ Lo campo elétrico

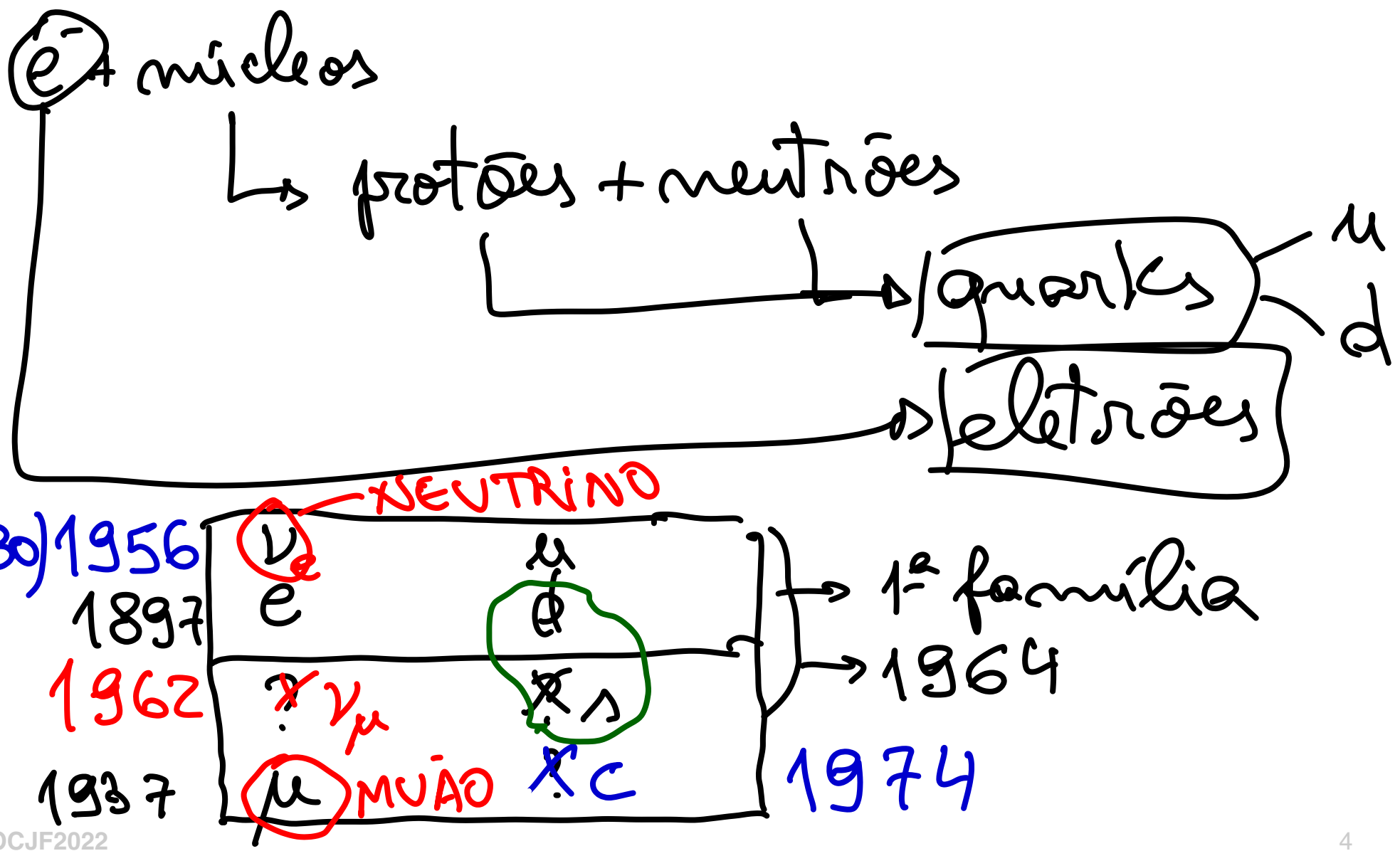
e = módulo da carga do eletrão





MICROSCÓPIO ELETRÓNICO



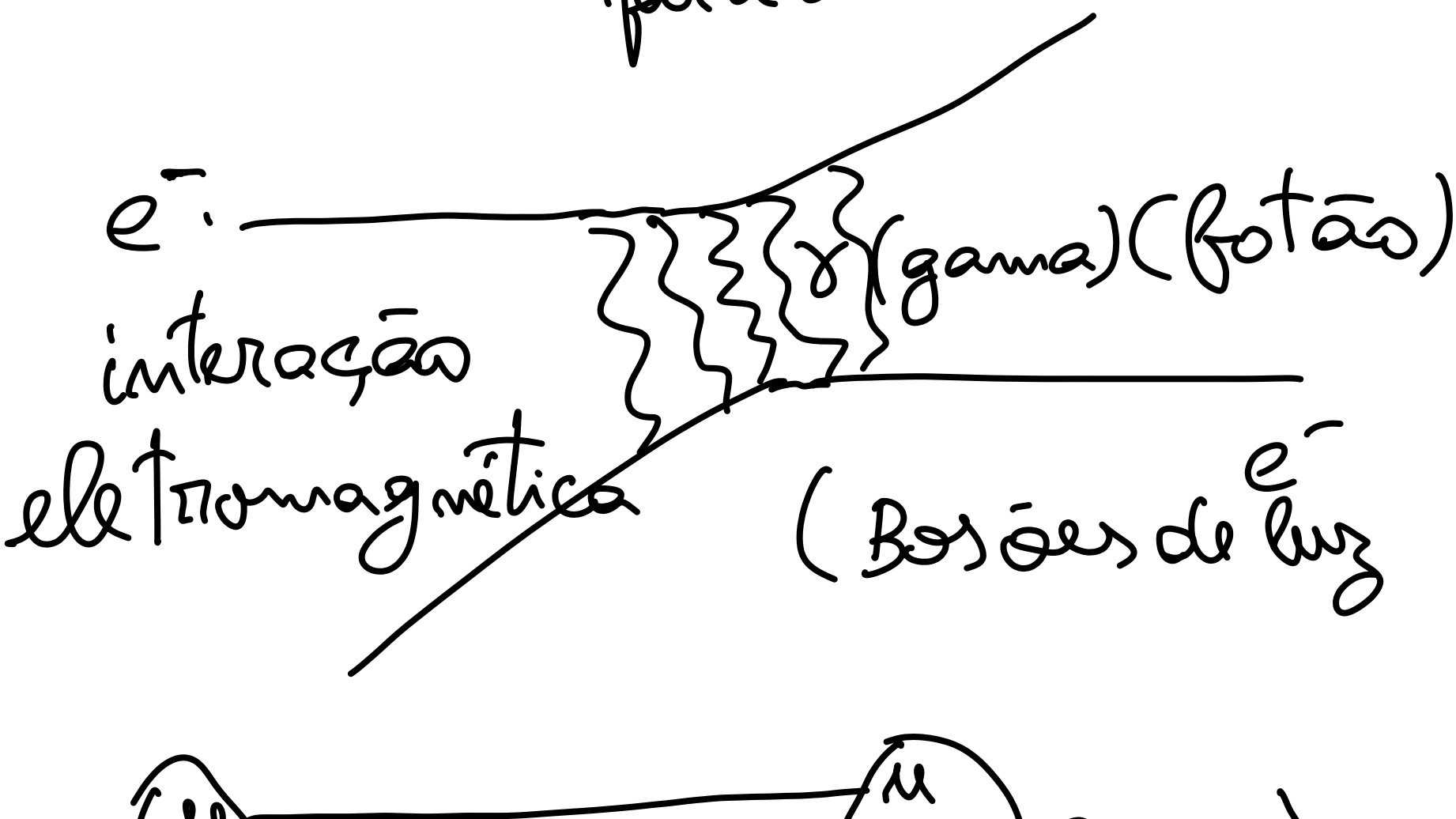


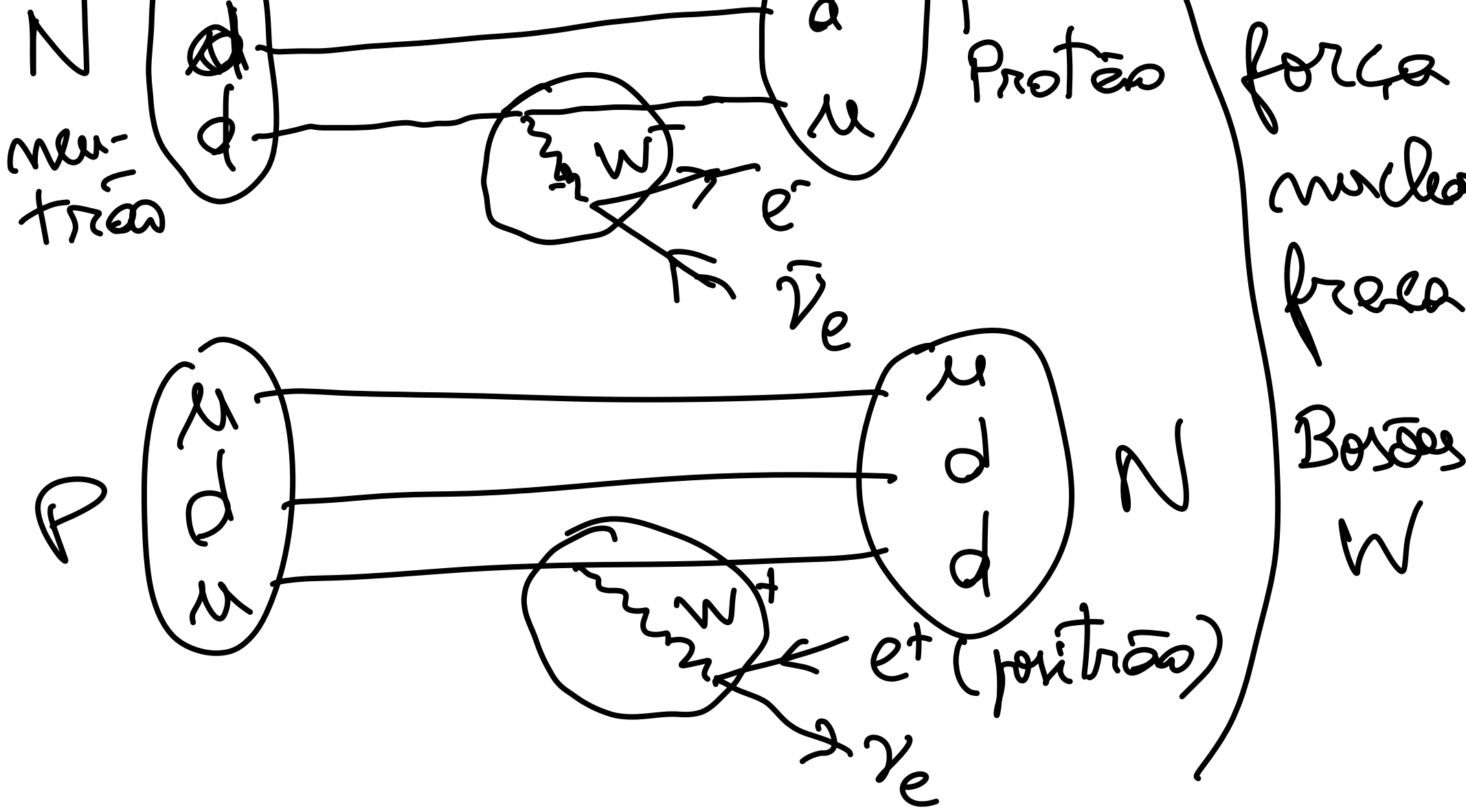
2001 ν_τ × t (TOP) 1995

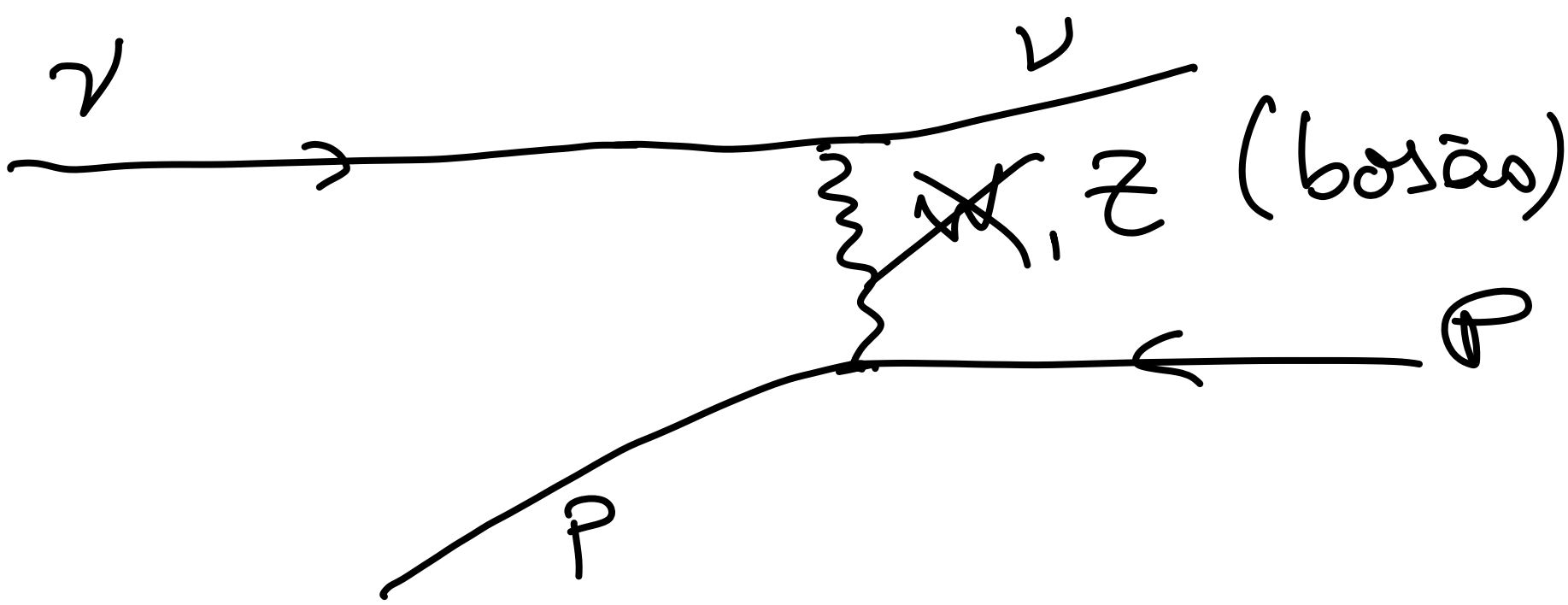
1975 τ × b 1977

τ TAU (BOTTOM)

↳ Anti-partícula ≠ cada partícula!







$m_\gamma = 0$

$m_g = 0$

$m_e = 9.1 \times 10^{-31}\,kg$

$\simeq 0{,}000511\ \underline{GeV/c^2}$ $\quad 10^9\ eV/c^2$

$(E = mc^2)$

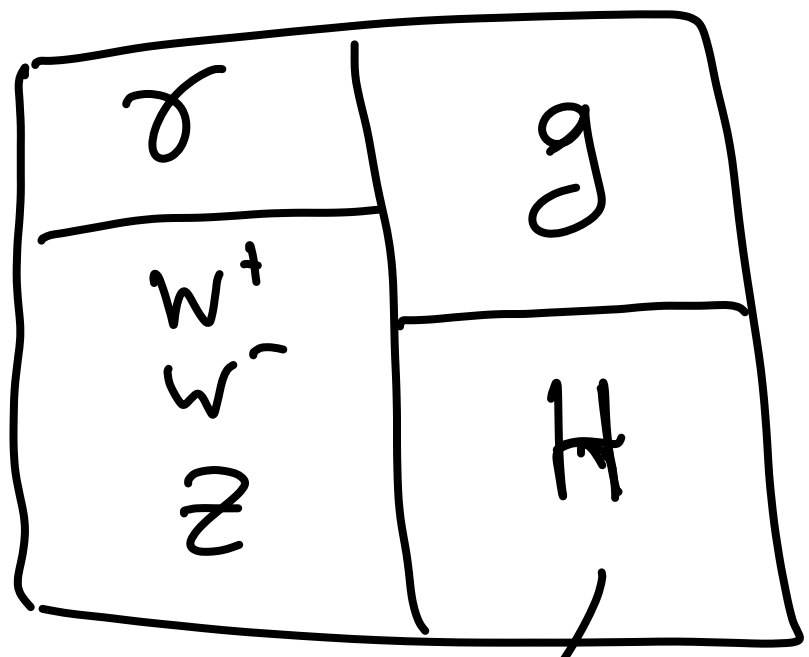
$m_{(\nu_e, \nu_\mu, \nu_\tau)} \lesssim 0{,}1\ eV/c^2$

$\vdots$

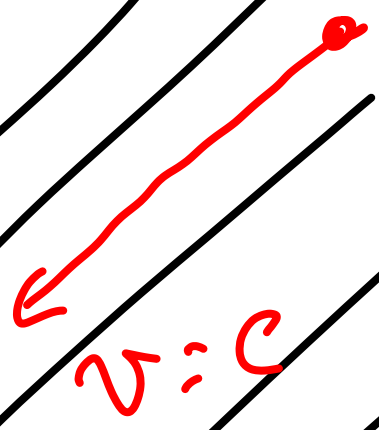
$m_{W^\pm} \simeq 80{,}434 \pm 0{,}0\ GeV/c^2$

$m_Z \simeq 91{,}187 \pm 0{,}002\ GeV/c^2$

$m_{top} \simeq 173\ GeV/c^2$ $\quad (m_p = 0{,}938\ \ldots)$



Bosão de Higgs



CAMPO DE HIGGS

⇒ Partícula ↓

↳ Bosão de

MATÉRIA ESCURA

ENERGIA ESCURA