q $\bar{q}$

μ^- μ^+

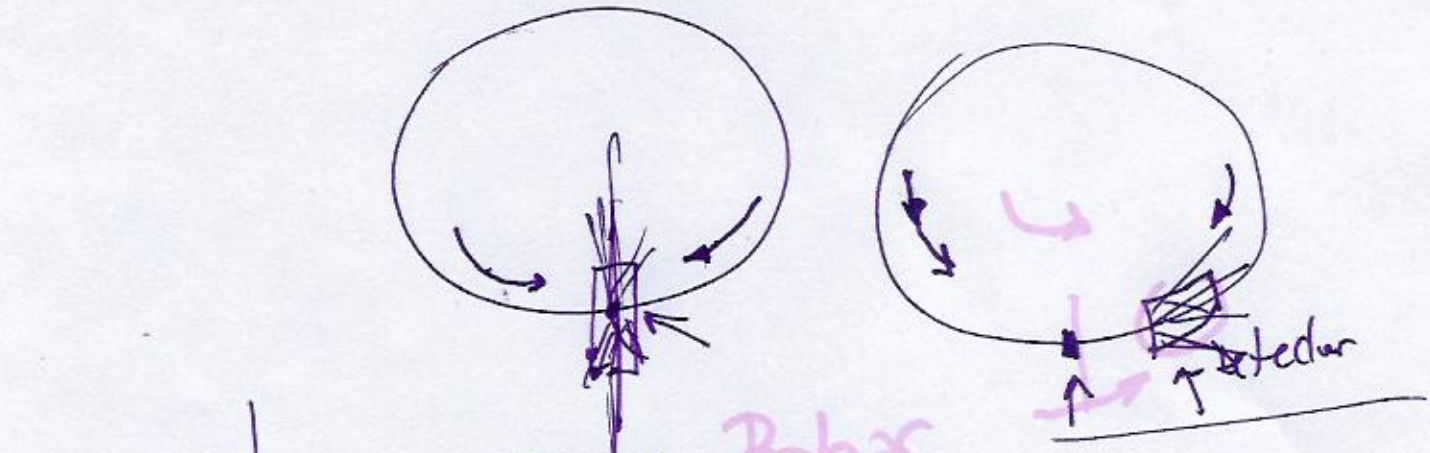
$\downarrow$

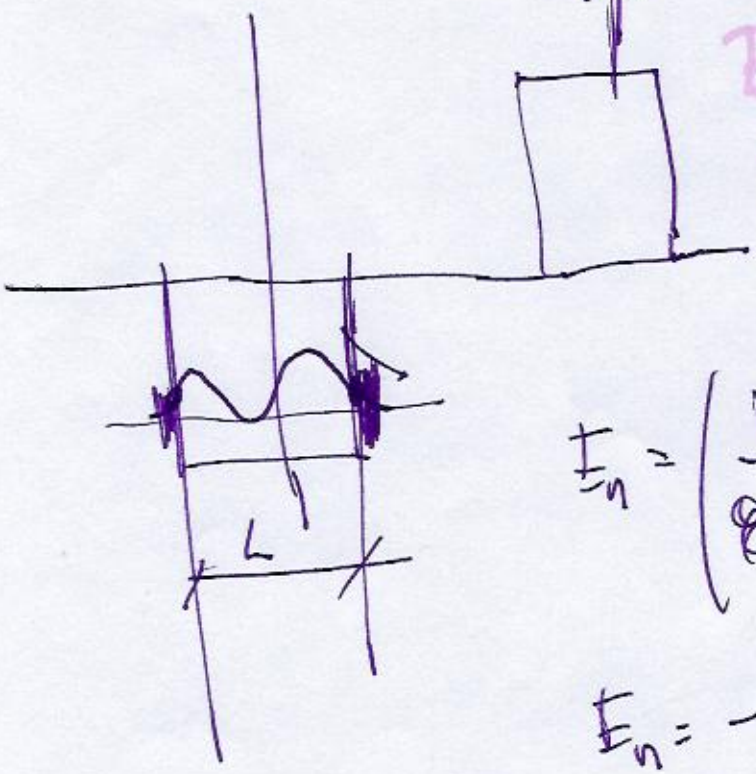
μ $\bar{\mu}$

~~$\nu_e \neq \bar{\nu}_e$~~

$\nu_e \stackrel{?}{=} \bar{\nu}_e$

Babar

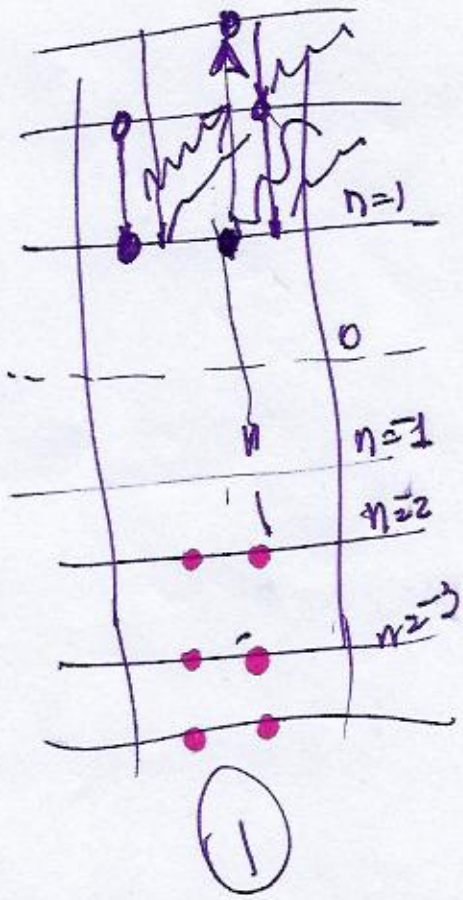




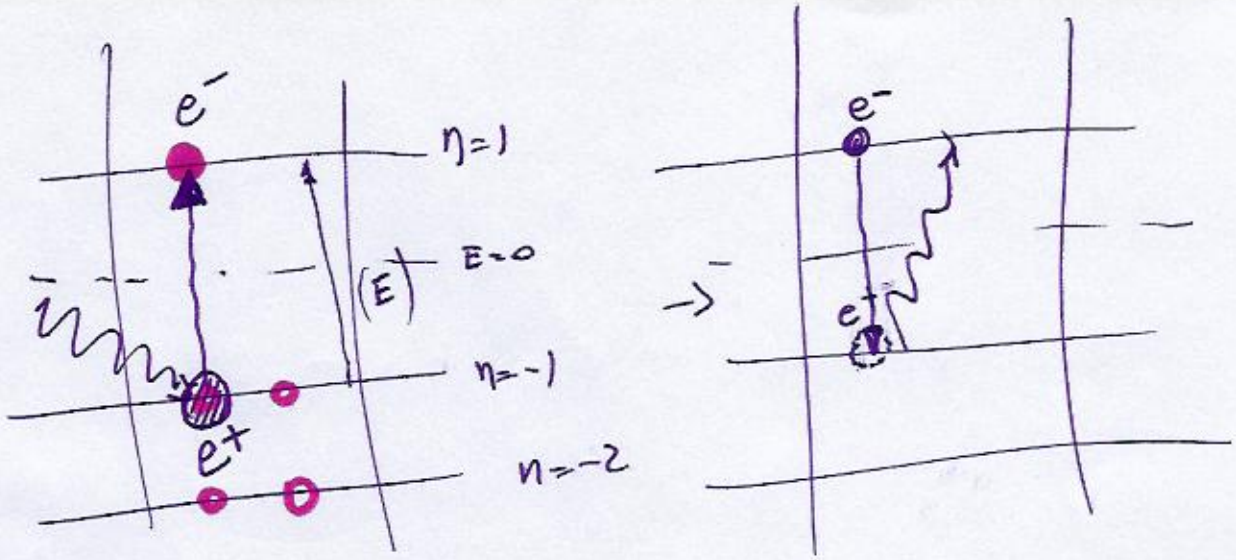
$$E_n = \left(\frac{h^2}{8mL^2}\right) n^2$$

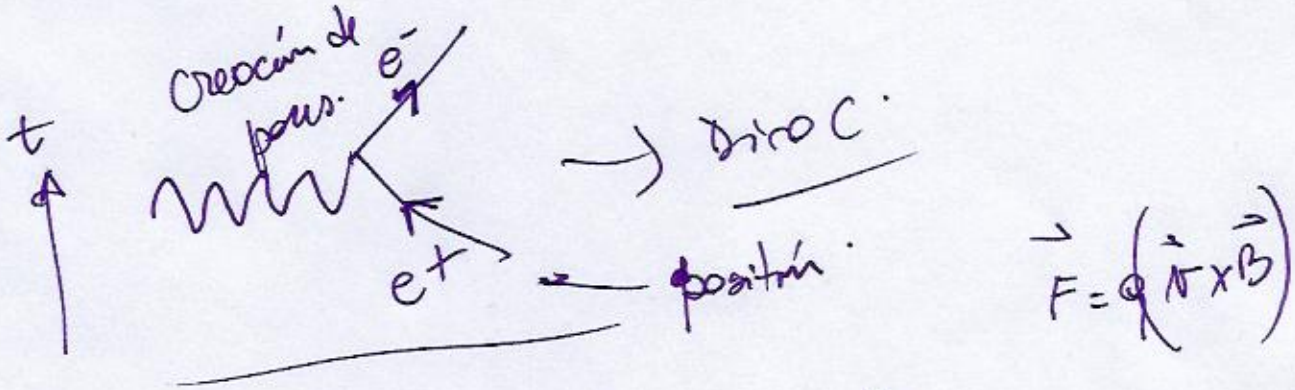
$$E_n = -\left(\frac{h^2}{8mL^2}\right) n^2$$

$$(i\not{\partial} - m)\psi = 0$$

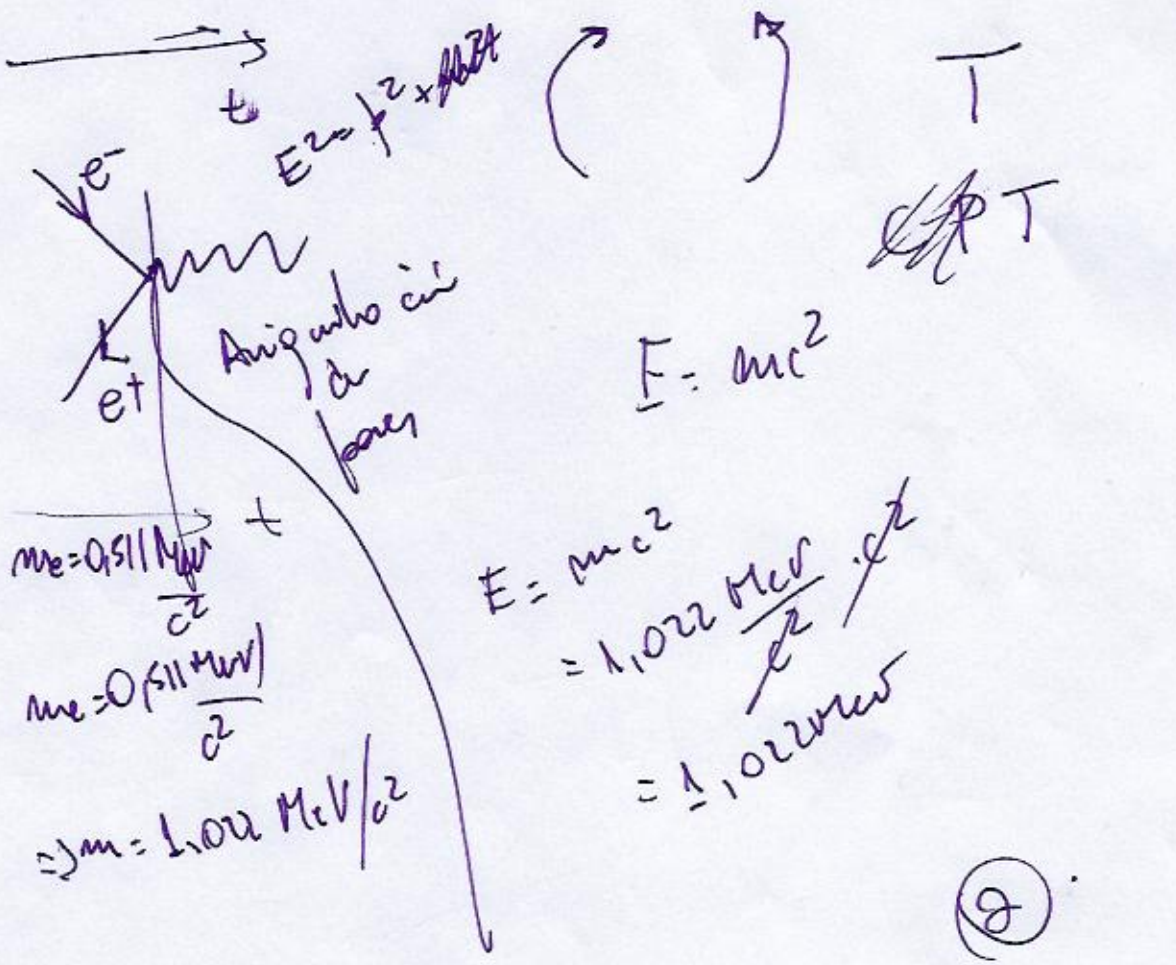


(1)





$\vec{F} = q(\vec{v} \times \vec{B})$



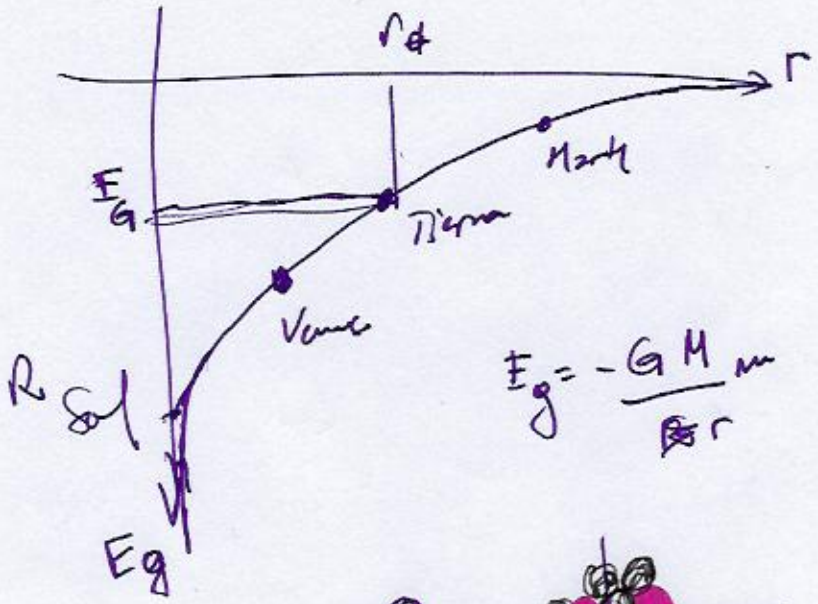
$E = mc^2$

$E = mc^2$

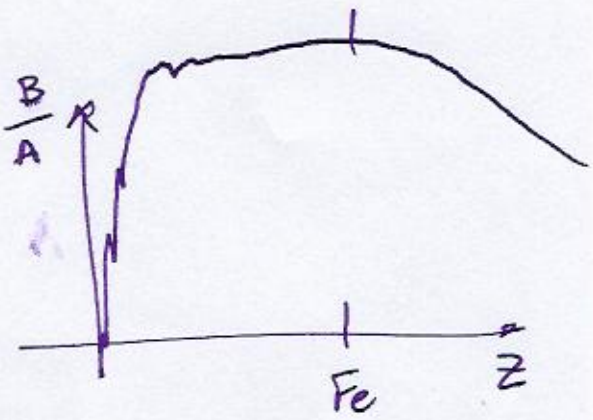
$= 1{,}022 \frac{MeV}{c^2} \cdot c^2$

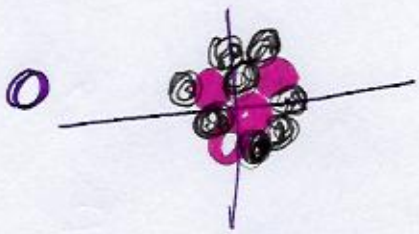
$= 1{,}022 MeV$

(2).



$$E_g = -\frac{G M_m}{r}$$





$^{210}_{83}Bi$

$^{210}_{127}Bi_{83}$

$A = 210$

$Z = 83$

$N = 127$

$^{A}_{N}X_{Z}$

$$^{210}_{127}Bi_{83} \longrightarrow {}^{210}_{126}Po_{84} + e^- + \beta^-$$

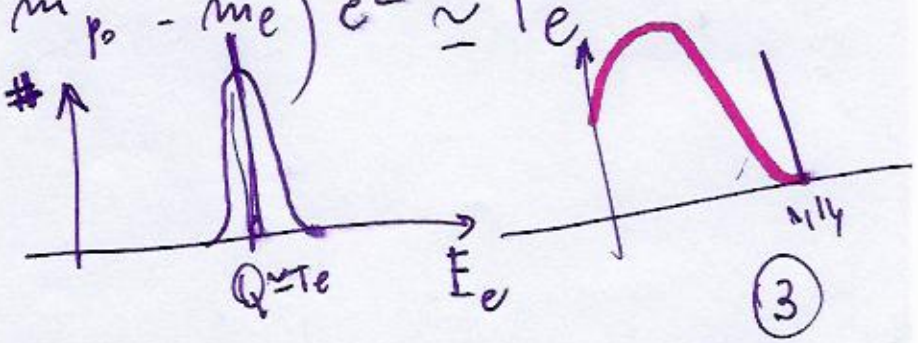
1,17
1,16 Mev
1,15
1,14

$$n \longrightarrow p^+ + e^- + \nu \quad \text{neutrino}$$

$$m_{Bi} = m_{Po} + m_e + Q$$

$$E = mc^2$$

$$Q = (m_{Bi} - m_{Po} - m_e)c^2 \simeq T_e$$



$m_{Bi} = 195\,589{,}471\ \text{MeV}/c^2$

$-\ m_{Po} = 195\,587{,}80\ \text{MeV}/c^2$

$-\ m_e = 0{,}511\ \text{MeV}/c^2$

$1{,}16\ \text{MeV} \cdot c^2$

c^2

$n^0 \longrightarrow p^+ + e^- + \nu^0 + Q$ | β^-

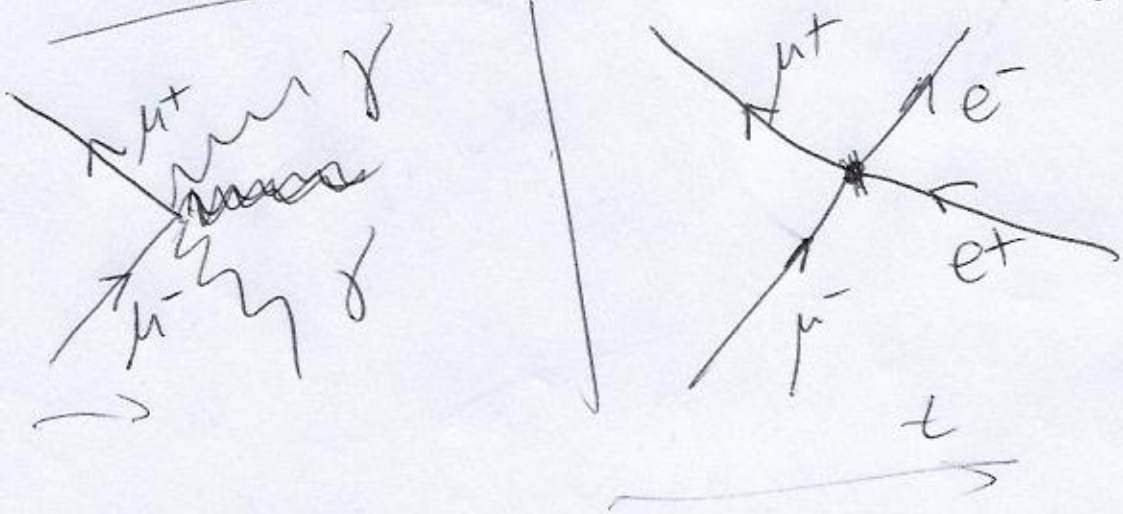
Propuesto Pauli

β^+

$\beta^+ : \ p^+ \longrightarrow n^0 + e^+ + \nu^0 + Q.$

$\pi^- \longrightarrow \mu^- + \nu^0$

Anderson para el descubrimiento del mesón π



$p \to n\, e\, \nu^0$

$\bar{\nu}^0\, p^+ \to n^0\, e^+$

~~$\nu_e\, p^+ \to n^0\, \mu^+$~~

~~$p^+ \to n^0\, e^+ + \bar{\nu}$~~

$$p^+ \to n^0\; e^+\; \nu_e$$

Dec β^+ Mod 2020

$$n \to p^+\; e^-\; \bar{\nu}_e$$

Dec β^- Mod 2020.

$e^- \to ?$

~~$e^- \to \nu_e^0$~~ E ✓ L ✓ L_e ✓

$+1$ $+1$

?

$\mu^- \to e^- \gamma$

$E = $ ✓

$Q = $ ✓ Q ✗

$L = $ ✓

$L_\mu = $

	$\mu^- \rightarrow$	e^-	ν_μ	$\bar{\nu}_e$	
E	✓	✓	✓	✓	☺
Q	✓	✓	✓		☺
L	+1	+1	+1	-1	☺
L_μ	+1	0	+1	0	☺
L_e	0	+1	0	-1	☺

$$\mu^- \rightarrow e^- \nu_\mu \bar{\nu}_e$$

Dec. μ^- 2020.

$$\mu^+ \rightarrow e^+ \bar{\nu}_\mu \nu_e$$

Dec μ^+ 2020.