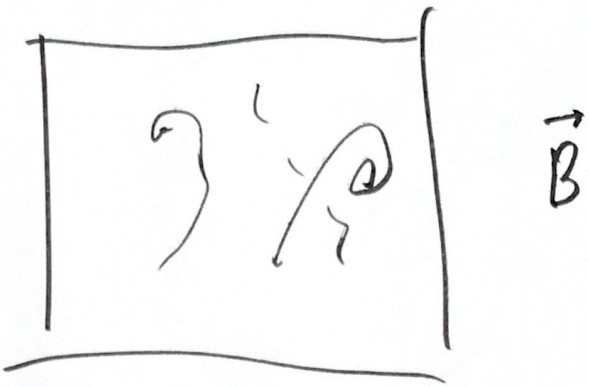
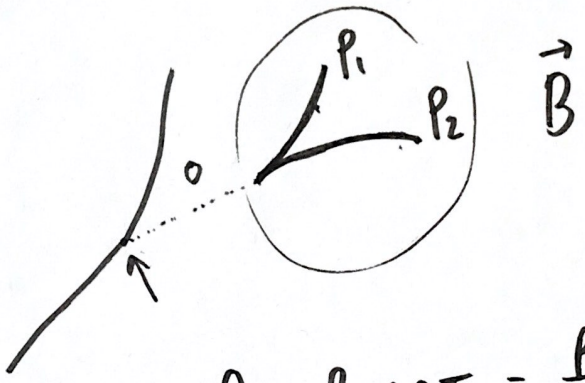
1947



"STRANO" PRODOTTI IN INT. FORTI

DECADENZA DEBOLE

"V"



$$\lambda = \beta\gamma c\tau = \frac{p}{E}\frac{E}{m} c\tau = \frac{p}{m} c\tau$$

$$\vec{p}_1 + \vec{p}_2 = \vec{p}_0$$

$$\Rightarrow \boxed{\tau = \frac{m}{p_0}\frac{\lambda}{c}}$$

DEBOLI $\tau \sim 10^{-10}$ s

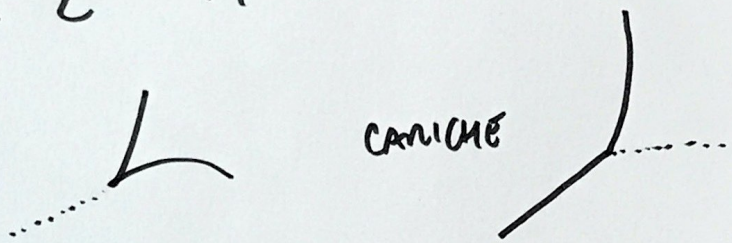
FORTI $\tau \sim 10^{-20}$ s

$K^{\pm}$ $M \sim 500$ MeV

K^{0} $M \sim 500$ MeV

IPERONI Λ $M \sim 1116$ MeV

$\Sigma^{+}\ \Sigma^{0}\ \Sigma^{-}$ $M \sim 1200$ MeV



$\pi^- p \to K^0 \Lambda$

$\pi^- p \to K^0 K^- p$

$\pi^+ n \to K^+ \Lambda$

$K^- \to \pi^- \pi^+ \pi^-$

$\Lambda \to p \pi^-$

coppia $e^- e^+$

$+1\ -1$

NUMERO QUANTICO ?

CONSERVATO DALLA FORZA FORTE

MA NON DALLA FORZA DEBOLE

PAIS: MOLTIPLICATIVA

P.LLE ORDINARIE = +1

" STRANE = -1

$$\pi^+ n \longrightarrow K^+ \Lambda$$

$(+1)(+1)$ $(-1)(-1)$

$+1$ $+1$

GELL-MANN: ADDITIVO

P.LLE ORDINARIE $\bullet$ $S=0$

P.LLE STRANE $S\neq 0$

$\rightarrow S(K^+) = +1$

$\pi^+ n \rightarrow K^+ \Lambda$ $\Rightarrow S(\Lambda) = -1$

$0+0$ $+1$ $-1 = 0$

$\rightarrow \Rightarrow S(K^-) = -1$

$\pi^- n \longrightarrow K^- \Lambda$

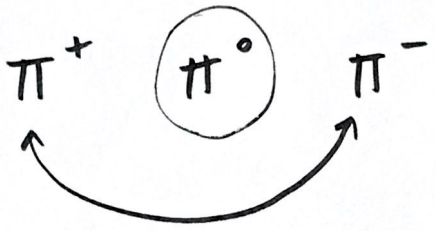
PAIS	$+1 \cdot +1 = +1$	$(-1)\cdot(-1) = +1$	OK
GELL-MANN	$0+0 = 0$	$-1-1 = -2$	NO

$\overline{\pi^0} = \pi^0$

$K^+ \quad S = +1 \qquad K^- \quad S = -1$

$K^0 \quad S = +1 \qquad \overline{K^0} \quad S = -1$

~~$\Sigma^+ \; \Sigma^- \; \Sigma^0$~~



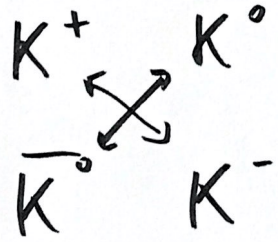
$\pi^+ \longrightarrow \pi^-$

$\pi^0 \longrightarrow \pi^0$

$K^+ \quad K^0 \quad K^-$

$S{+}1 \qquad S{=}{-}1$

$K^0 \longrightarrow \overline{K^0}$



$\Sigma^+ \; \Sigma^0 \; \Sigma^-$

$S(K^+) = +1$

$\pi^- p \to K^0 \Sigma^0$ $\Rightarrow S(\Sigma^-) = -1$

$\pi^- p \to K^+ \Sigma^-$

$\pi^+ n \to K^+ \Sigma^0$ $\Rightarrow S(\Sigma^0) = -1$

$\pi^+ n \to K^0 \Sigma^+$ $\Rightarrow S(\Sigma^+) = -1$

$\pi^+ p \to K^+ \Sigma^+$

NON $\pi^- p \to K^- \Sigma^+$

PAIS $1 \cdot 1 = 1$ $(-1)\cdot(-1) = +1$ OK

G-M $0+0=0$ $-1-1=-2$ NO

$\Xi^- \; \Xi^0$

$K^- p \to \Xi^- K^+$

$K^- p \to \Xi^0 K^0$

$S = -1+0 = -1$ $-2+1 = -1$

$S(\Xi) = -2$ $\Xi^- \to \Lambda \pi^-$

$S = -2$ $-1+0 = -1$

STRANEZZA NUOVO NUMERO QUANTICO

CONSERVATO IN INT. FORTI

PUÒ VARIARE DI 1 UNITÀ NELLE DEBOLI

$$\underset{+1}{\Lambda^0} \to p\,\pi^- \qquad \left.\begin{array}{l}\\\\\end{array}\right\} \text{DEBOLI}$$

$$\underset{+1}{\Lambda} \to n\,\pi^0$$

$$\to \underset{+1}{\Lambda} \to K^-\,\pi^+ \qquad \underline{\text{NUMERO BARIONICO}}$$

$S=-1 \qquad S=-1$

è IL BARIONE STRANO PIÙ LEGGERO

ϑ/τ PUZZLE

$$\left.\begin{array}{l}"\theta^+" \to \pi^+\pi^0\\ "\tau^+" \to \pi^+\pi^-\pi^+\end{array}\right\} K^+$$

PARITÀ

PARITÀ $\quad x \longrightarrow -x$

$$P[\psi(x)] = \psi(-x)$$

$P[\psi(x)] = \psi(-x) = \psi(x)$ PARI $P = +1$

$P[\psi(x)] = \psi(-x) = -\psi(x)$ DISPARI $P = -1$

$P \cdot P[\psi] = \psi$ unitario

$P(\psi_0 \cdot \psi_p \cdot \psi_p) \rightarrow (-1)\cdot(+1)\cdot(+1)$

(H) $P(\psi) = (-1)^{\ell}$ ←

PARITÀ INTRINSECA ± 1

$$P_f \cdot P_{\bar{f}} = -1$$

$P(e^-) = +1 \Rightarrow P(e^+) = -1$

$P(p) = P(u)P(u)P(d) = (+1)(+1)(+1)$

$= +1$

↑

(uud)

$\pi^+ = u\bar{d}$

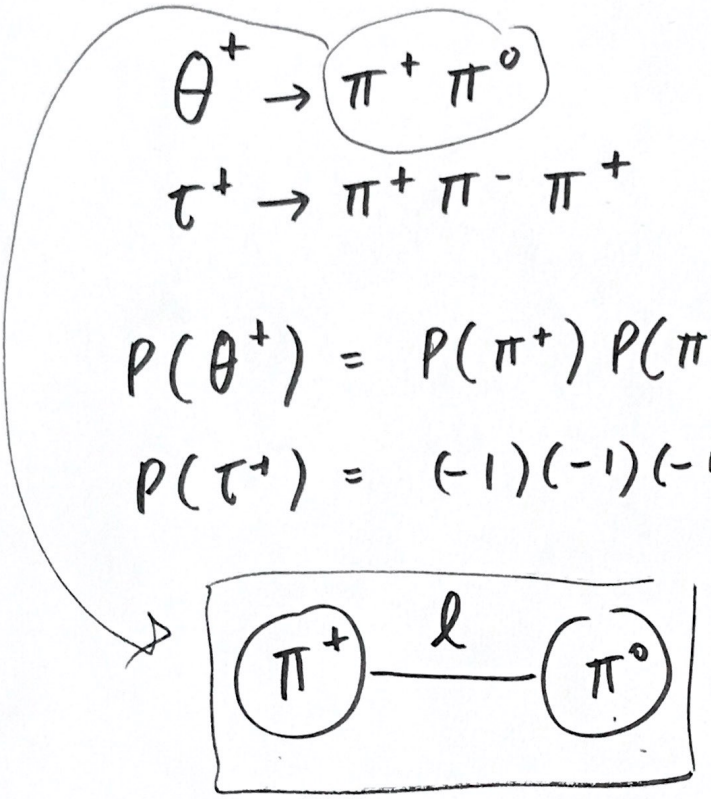
$P(\pi^+) = P(u)\,P(\bar{d}) = (+1)(-1) = -1$

$\theta^+ \rightarrow \pi^+ \pi^0$

$\tau^+ \rightarrow \pi^+ \pi^- \pi^+$

$P(\theta^+) = P(\pi^+)\,P(\pi^0) = (-1)(-1) = +1$

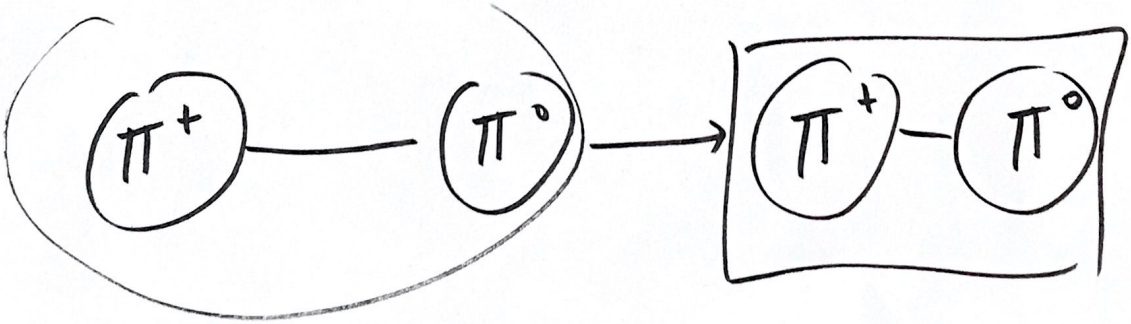
$P(\tau^+) = (-1)(-1)(-1) = -1$



$P(\pi^+ \pi^0) = P(\pi^+)\,P(\pi^0) \cdot (-1)^{\ell}$

$P(\pi^+ \pi^- \pi^+) = P(\pi^+)\,P(\pi^-) \cdot P(\pi^+)$

$\cdot (\quad)$



LEE e YANG 1956

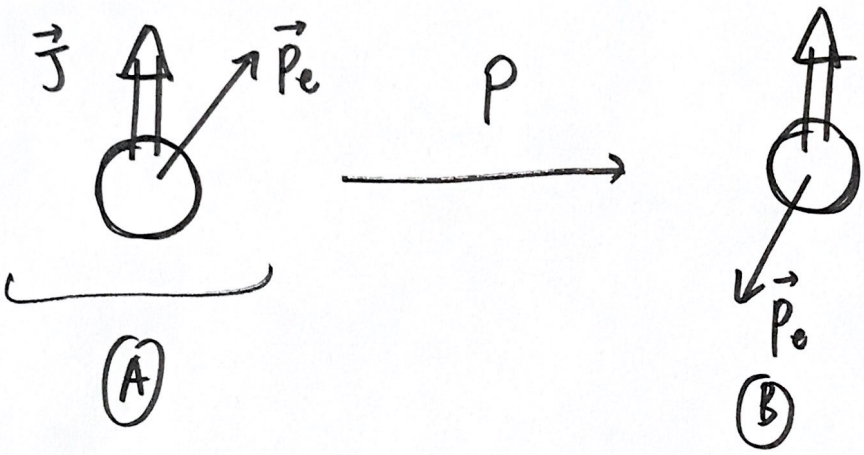
θ^+ τ^+ stessa M, Q, τ

WU

$P(\vec{V}) = -\vec{V}$ vettori

$P(\vec{S}) = \vec{S}$ pseudovettori

$0 = \vec{S} \cdot \vec{P}$



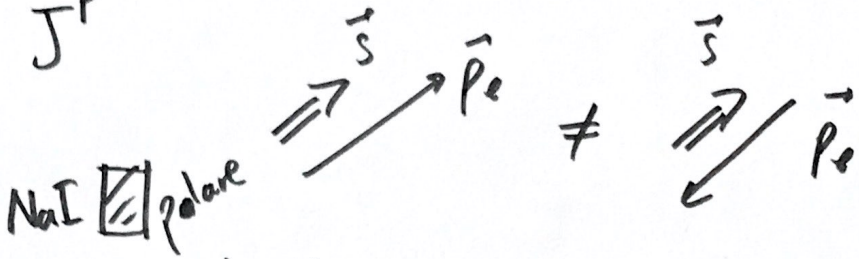
se P è conservata dal decad. β $\Rightarrow$ (A) = (B)
(forze debol)

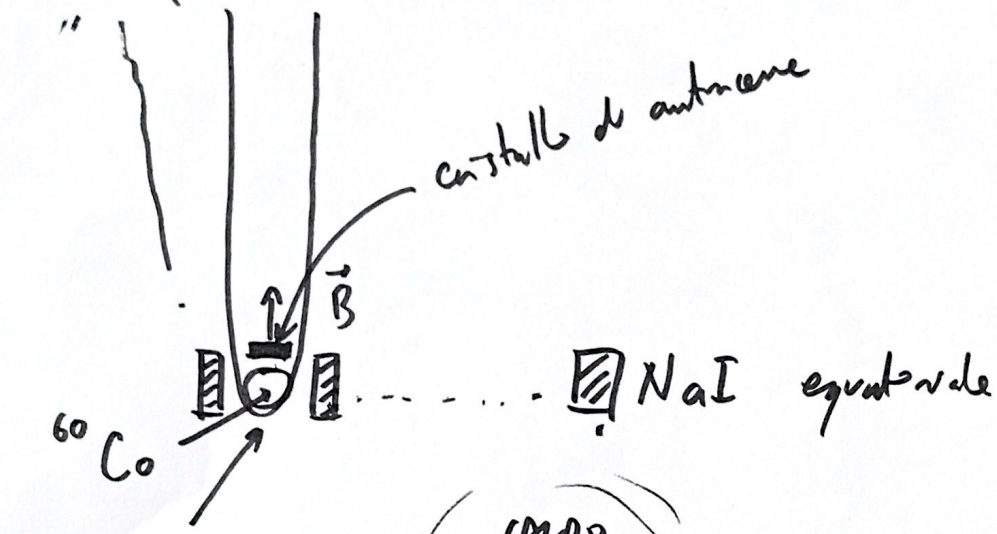
se (A) $\neq$ (B) $\Rightarrow$ le interazioni debol violano P

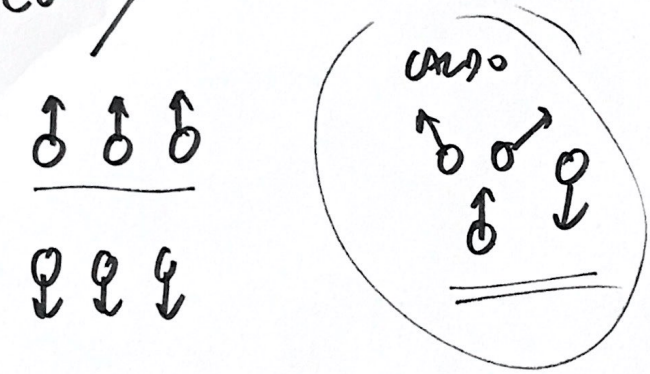
$^{60}Co(5^+) \rightarrow {}^{60}Ni^*(4^+)\ e^-$ (+ve)

$\hookrightarrow {}^{60}Ni(0^+)$ $\boxed{+\gamma+\gamma}$ 1.17 1.3 MeV

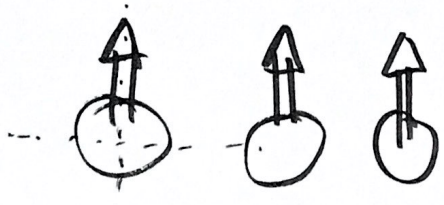
J^P

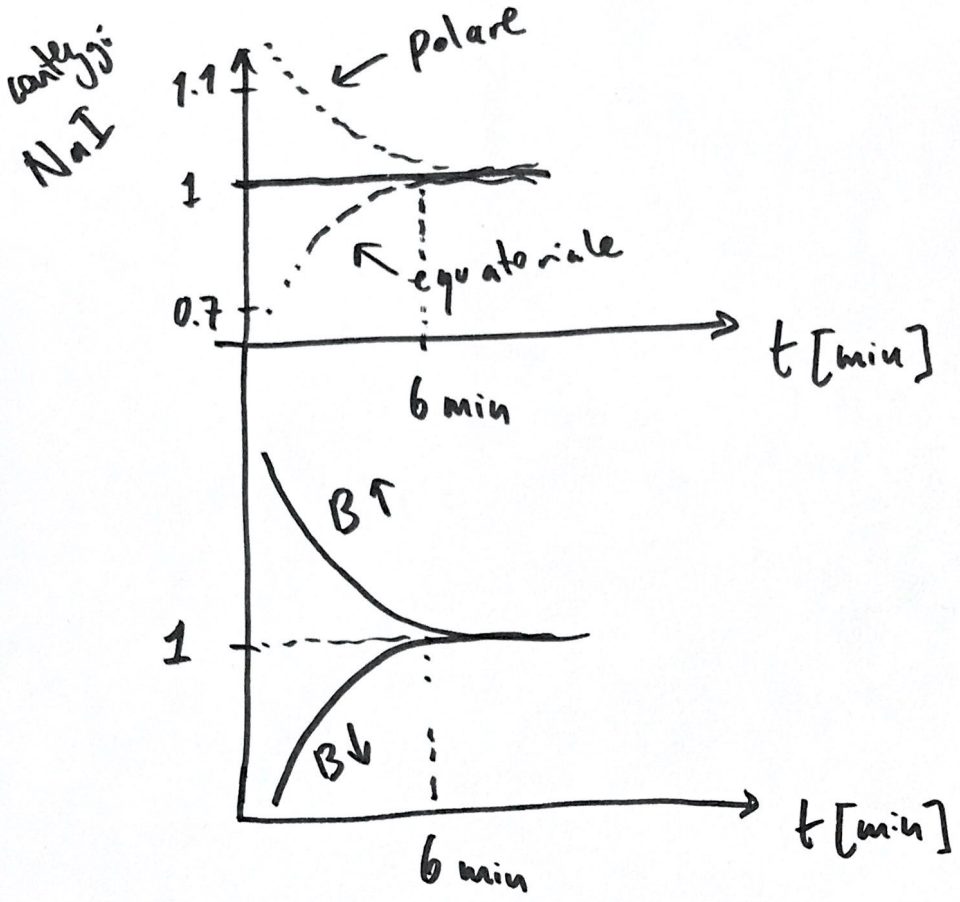


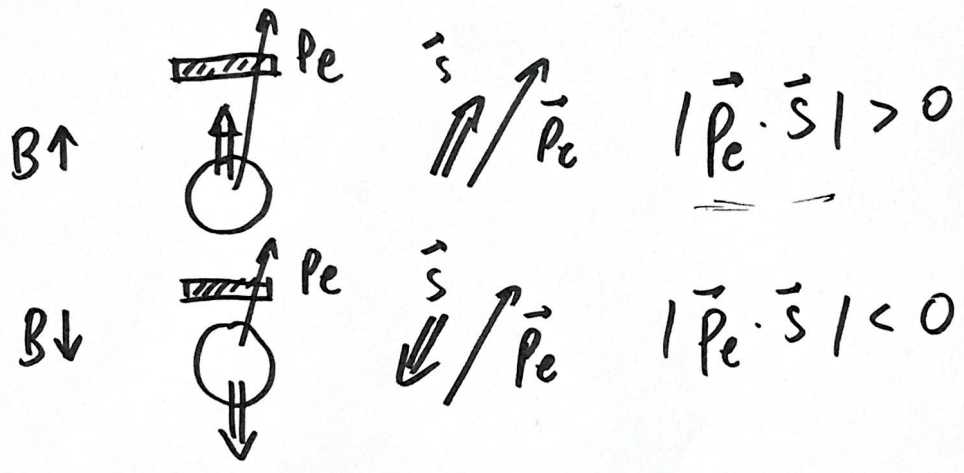


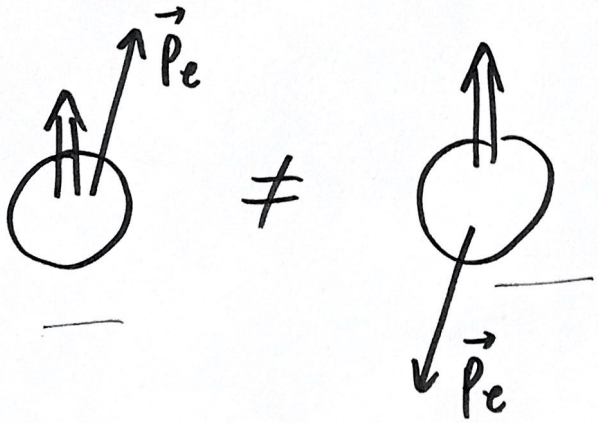


$^{60}Ni^*(4^+) \rightarrow {}^{60}Ni(0^+) + \gamma + \gamma$




conteggi
NaI
1.1
1
0.7
polare
equatoriale
t [min]
6 min
B↑
1
B↓
t [min]
6 min


B↑
Pe
$\vec{s}$
$\vec{P_e}$
$|\vec{P_e} \cdot \vec{s}| > 0$
B↓
Pe
$\vec{s}$
$\vec{P_e}$
$|\vec{P_e} \cdot \vec{s}| < 0$


$\vec{P_e}$
≠
$\vec{P_e}$