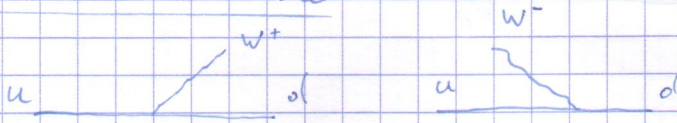


① Arbres, Pingouin et boîtes

if pour W

• Diagramme en arbre

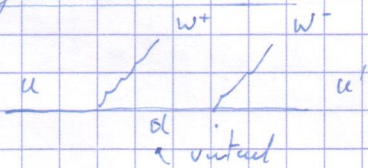


• Diagramme en pingouin



→ $\sum Z, \gamma$ pingouin électrofaible

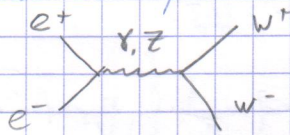
• Diagramme boîte



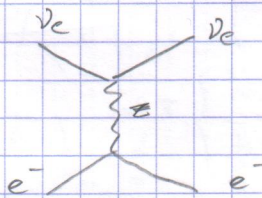
② Processus Permis, interdit

1) $\gamma p \rightarrow e^- \gamma$ → interdit pour B, L_e, Q

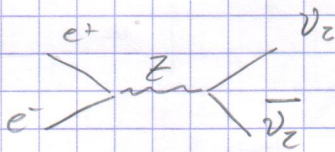
2) $e^+ e^- \rightarrow W^- W^+$ → OK à partir énergie seuil



3) $\nu_e e^- \rightarrow \nu_e e^-$
permis pour if



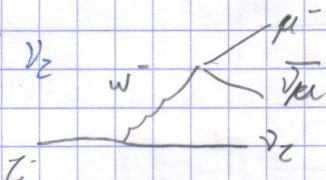
4) $e^+ e^- \rightarrow \nu_e \bar{\nu}_e$
permis if



5) $\mu^- \rightarrow \tau^- \bar{\nu}_e \nu_\mu$

B, L_μ, L_e, Q OK → $m_e \gg m_\mu \rightarrow$ désintégration non permise

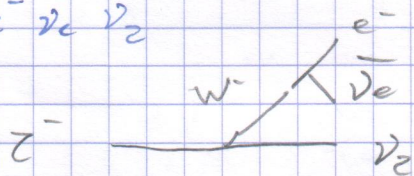
6) $\tau^- \rightarrow \mu^- \bar{\nu}_\mu \nu_\tau$
if



7) $\tau^- \rightarrow e^- \bar{\nu}_e \nu_\tau$

L_μ, L_e non vérifiés

8) $\tau^- \rightarrow e^- \bar{\nu}_e \nu_\tau$



9) $\bar{\pi}^+ \rightarrow \mu^+ \nu_e$

L_μ, L_e non conservés

10) $\bar{\pi}^+ \rightarrow \mu^+ \nu_e$

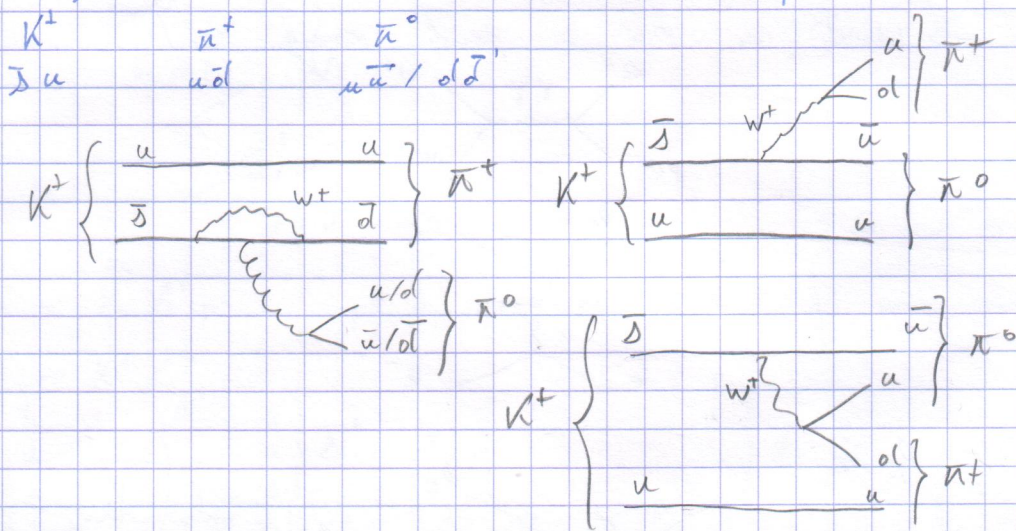
L_μ, L_e non conservés

11) $K^+ \rightarrow \mu^+ \nu_\mu$

$K^+ \rightarrow u \bar{s}$

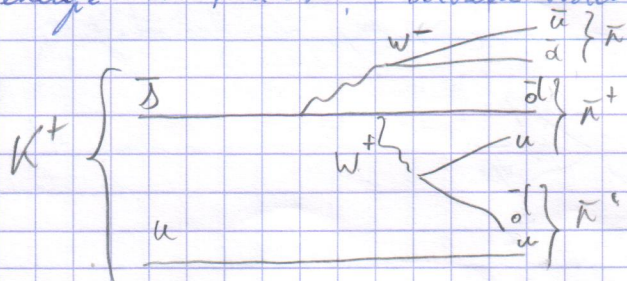
12) $K^+ \rightarrow \bar{\pi}^+ \pi^0$

energie OK, Q OK, saveur violée \rightarrow if?

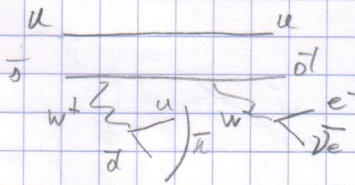


13) $K^+ \rightarrow \pi^+ \pi^- \pi^0$

energie OK, Q OK, saveur violée \rightarrow if?



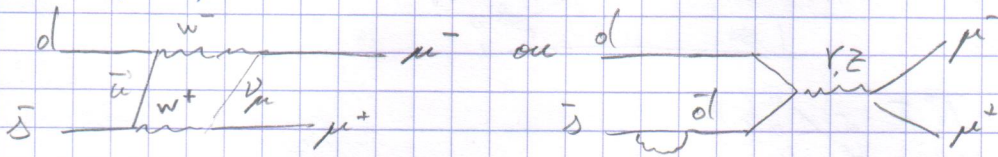
14) $K^+ \rightarrow \bar{\pi}^+ \bar{\pi}^+ e^- \bar{\nu}_e$



15) $K^+ \rightarrow \bar{\pi}^+ \mu^- e^+$

L_μ, L_e non conservé

16) $K^0 \rightarrow \mu^+ \mu^-$



17) $\bar{\pi}^0 \rightarrow \mu^+ \mu^-$

énergie incompatibles.

18) $p \rightarrow e^+ \gamma \rightarrow pb B, Le$

19) $p \rightarrow e^+ \pi^0 \rightarrow pb B, Le$

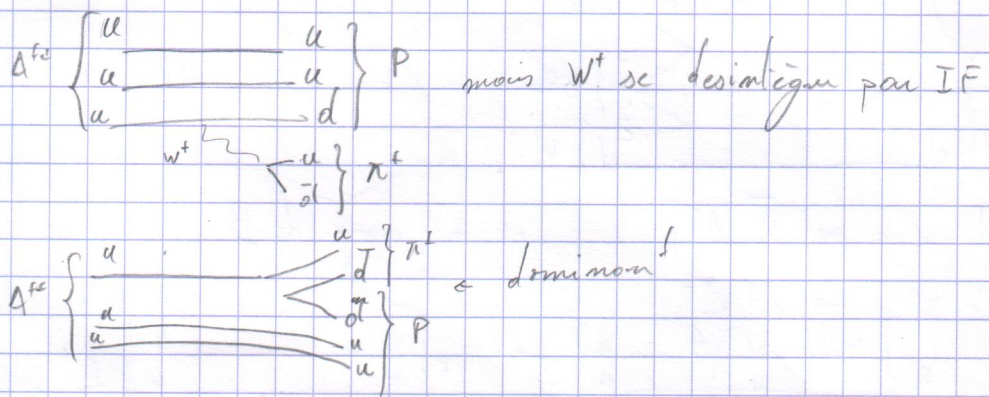
2 réactions réservées dans le PDG via des lim sup pour les BR.

20) $p \rightarrow n e^+ \nu_e$

pas possible à cause de l'énergie.

21) $n \rightarrow p \nu_e \bar{\nu}_e$ impossible à cause de la charge

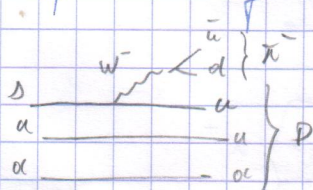
22) $\Delta^{++} \rightarrow p \pi^+$



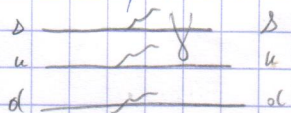
23) $\Delta^{++} \rightarrow p \gamma \rightarrow$ impossible à cause charge

24) $\eta^0 \rightarrow p \pi^-$ \rightarrow disparaît \rightarrow if

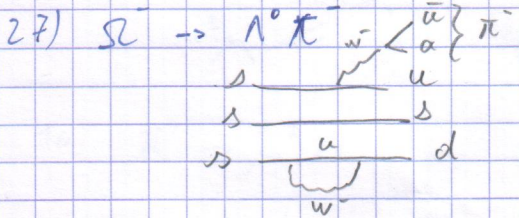
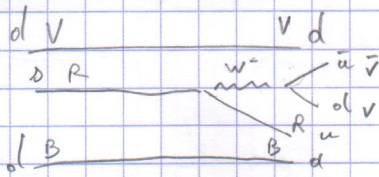
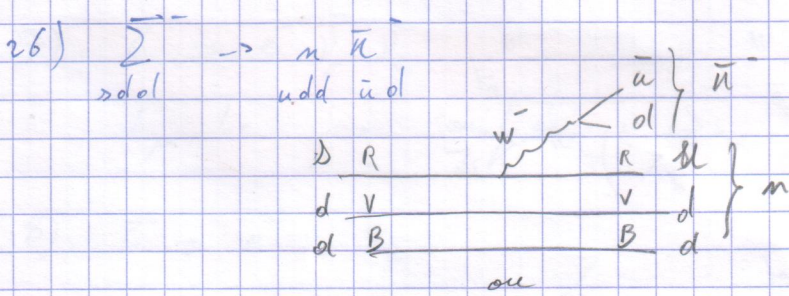
su et uod uod



25) $\Sigma^0 \rightarrow \eta^0 \gamma \rightarrow$ EM (quarks $f \rightarrow$ part f)

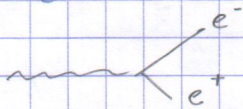


\rightarrow on ne sait pas quel quark rayonne



28) $\pi^+ \rightarrow \mu^+ e^+ e^- \nu_\mu \rightarrow p b l c$

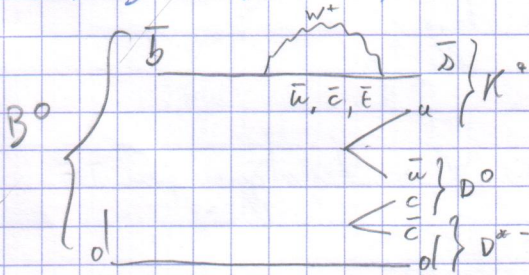
29) $\pi \rightarrow e^- e^+$



impossible car non cons de l'impulsion, on peut trouver un ref. où $\{e^-, e^+\}$ sont au repos et π en mouvement.

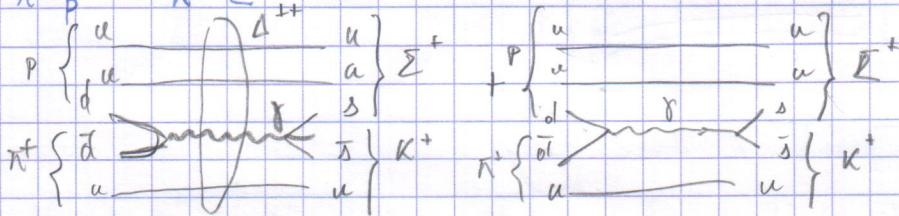
Mais réaction possible au niveau atomique

30) $B^0 \rightarrow D^{*-} D^0 K^+$



31) $e^+ n \rightarrow \bar{\nu}_e \Lambda^0 p$ pb à cause de B

32) $\pi^+ p \rightarrow K^+ \Sigma^+$



33) $\pi^+ e^- \rightarrow \bar{\nu}_e \mu^+ \nu_\mu$ pb B Lc

