

湯川, Dec. 3, 1955

(1)

1. 複合核型で KALTI のことか? *primary particle*
2. I.S. η or lepton μ の S = 0 否か?
3. lepton に対して新しい状態があるか?
4. weak interaction に関係あるか?
 lepton の μ の w.i.
 strong int. の partner の μ の weak interact.
 s.i.p. & lepton の w.i. *primary interaction*

1 核子の 複合核型

	Urteilchen			N, P, Λ		
	S	E	I_3	n	S	
N	$1/2$	A	$-1/2$	1	0	} normal π
P	$1/2$	A	$+1/2$	1	0	
Λ	$1/2$	B	0	1	-1	} strange
\bar{N}	$1/2$	B	$+1/2$	-1	0	
\bar{P}	$1/2$	B	$-1/2$	-1	0	
$\bar{\Lambda}$	$1/2$	A	0	-1	+1	

strong $\Delta I_3 = 0, \Delta S = 0$
 weak $\Delta I_3 = \pm 1/2, \Delta S = \pm 1$

$\bar{N}N, \bar{P}P, \bar{\Lambda}\Lambda$
 $\bar{N}N, \bar{P}P, \bar{\Lambda}\Lambda$ etc etc

$n=0$ pion family (meson family)
 1S_0 $\pi = K + \bar{K}$

1S_0 $\rho = K + \bar{K}$

1P_0 ρ

$n=1$ baryon family

$\bar{N} + \bar{P} + \bar{\Lambda}$	5
$\bar{N} + \bar{P} + \bar{\Lambda}$	-1
$\bar{N} + \bar{P} + \bar{\Lambda}$	-2

(2)

2. 四重共 Fermi-Young model

$$(E - H_1 - H_2) \varphi = \sum (\gamma_i P_i) (\alpha_i P_i)_z \varphi V$$

$$\varphi(r) = \sum_{\sigma, p} \lambda_p^\sigma(r) P_p^i \sigma C$$

singlet triplet

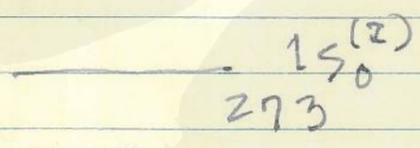
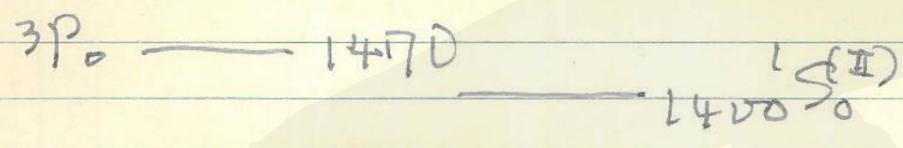
$$\left\{ 1 - \left(\frac{m_1 - m_2}{E} \right)^2 \right\} \left\{ 1 - \left(\frac{E}{m_1 + m_2} \right)^2 \right\} > 0$$

$|m_1 - m_2| < E < m_1 + m_2$
 vector interaction (or tensor)

$$\int \bar{\psi}(x) \gamma_\mu \psi(x) \cdot \bar{\psi}(y) \gamma_\mu \psi(y) V(|x-y|) d^3x d^3y$$

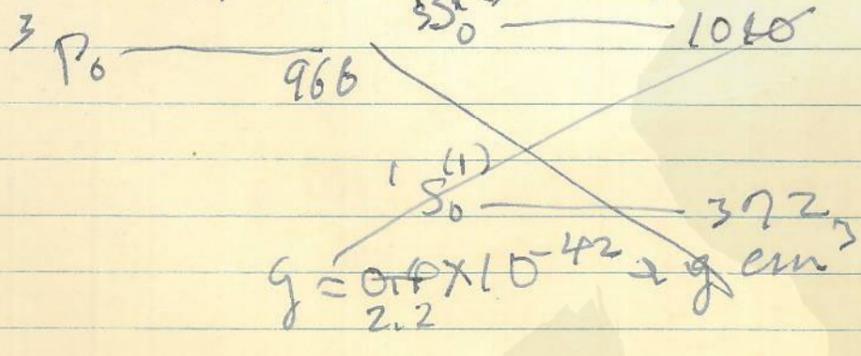
$$g = \frac{4\pi}{3} V R^3$$

$\pi(N+\bar{N})$



$g = 1.5 \times 10^{-42} \text{ erg cm}^3$

$K(\tilde{\Lambda}+N)$



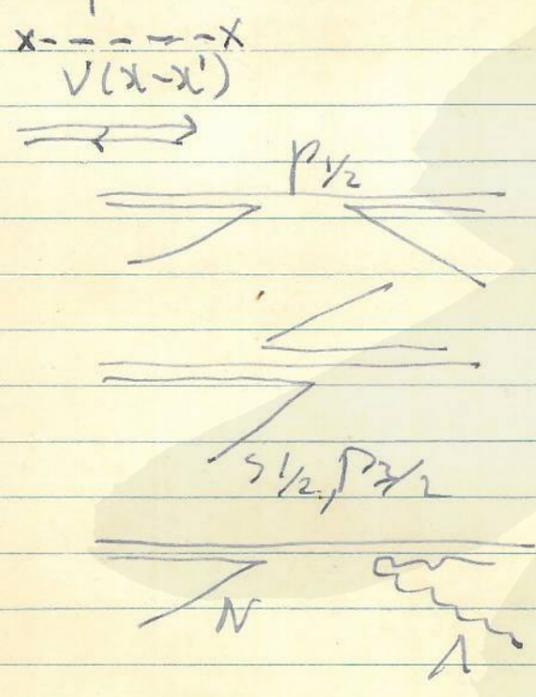
(3)

$\Delta = 342$
 $1S_0 \text{ --- } 966$

$3P_0 > m_1 + m_2$

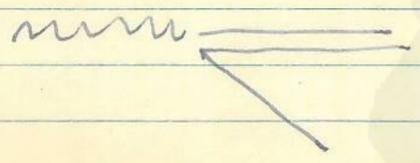
$g = \frac{0.4}{2.2} \times 10^{-42}$ $\begin{cases} \gamma_0 = \frac{h}{mc} \\ V = 2G.4 Mc^2 \end{cases}$

強い
 強い
 強い

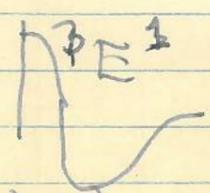


strong

weak:



N-N



BE3



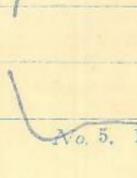
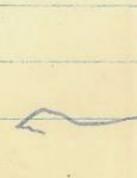
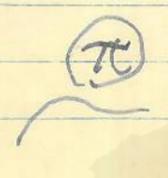
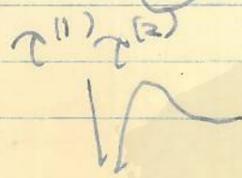
SO3



'0'



N-N



(A)

Elect. Mg. Interaction

Weak Interaction $\sim 10^{-6}$

$$\Lambda^0 \rightarrow p + \pi^-$$

$$\Sigma^0 \rightarrow \pi^+ + \pi^-$$

$$N \rightarrow p + e + \nu$$

$$p + \mu + \nu$$

$$\pi \rightarrow \mu + \nu$$

$$\mu \rightarrow e + \nu + \bar{\nu}$$

μ, e, ν

$$\left(K \rightarrow \mu + \nu^0 + \bar{\nu}^0 \right)$$

$$\left(\mu + \nu^0 + \pi^0 \right)$$

$\hbar, c, r_0 \sim 10^{-13} \text{ cm} \rightarrow g (\text{dimensionless})$

(1) $g^2 \sim 10^{-13} \sim 10^{-15}$

1) Fermi interaction

(NN) (e ν)

(NN) ($\mu\nu$)

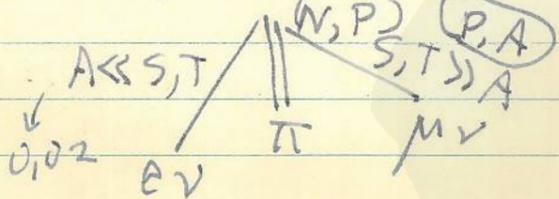
($\mu\nu$) (e ν)

? $\beta: S, T$

Michel

primary interaction

(universal interaction)



$$\left. \begin{array}{l} \pi \rightarrow e + \nu + \bar{\nu} \\ \pi \rightarrow \mu + \nu \end{array} \right\} 10^{-4} \left(\frac{g_{\pi}}{g_A} \right)^2$$

universal difficulty

$$K \rightarrow \mu + \dots$$

