Research Institute for Fundamental Physics
Kyoto University

福田信之氏：

1. Q.F.T. の矛盾.
2. observable について.

1. Källen - Pauli
   Lehmann - Sym. - Zim.
   ghost - state
   Landau $e_0 \to e = 0$
   Heisenberg
   Ferretti
   Cini - Fubini
   dipole ghost $M,\ M+\varepsilon$
   Low - Chew

L.S.Z.: $\Gamma_5(p_1, p_2) = \gamma_5 f(-(p_1 - p_2)^2)$

$$\frac{1}{8\pi^2}\int_{4M^2}^{\infty} \frac{k\sqrt{k^2-4M^2}}{(k^2-m^2)^2}\,|f(k^2)|^2\, d(k^2) < 1$$

$p_1^2 \to \infty \quad \Gamma_5 \to 0$

$$\because \quad \Delta_F'(p^2) = \Delta_F(p) - i\int_{(3m)^2}^{\infty} \frac{\sigma(\lambda^2)\, d\lambda^2}{p^2+\lambda^2-i\varepsilon}$$

positive norm. $\sigma(\lambda^2) \geq 0$

$$\sigma(k^2) = F(k^2)\,|\Delta_F'(k^2)|^2$$

$$\langle A(x)\, A(y)\rangle_0 = \sum_a \langle 0|A(x)|\phi_m^{(a)}\rangle \times \langle \phi_m^{(a)}|A(y)|0\rangle$$

$$\int_{3m^2}^{\infty} \frac{F(k^2)\,dk^2}{(k^2-m^2)^2} \leq 1.$$

$\Gamma_5 = g\gamma_5$ (1st appr.)

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Lee model: $\Gamma = g$

$$g^2 = Z_2 g_0^2$$

$$\frac{g^2}{g_0^2} = \frac{1}{1+g_0^2 A} = 0 \quad \text{without cut-off}$$

$g \to$ finite　　$g_0 \to i\infty$

Källen-Pauli

cut-off

$$\frac{g^2}{g_0^2} = \frac{1}{1+g_0^2 A(P)}$$

もし $g^2 < g_r^2(P)$

$g_{exp}^2 > g_r^2(P)$ なら

ghost state　　$V \rightleftarrows N + \theta$

— m_V

— ghost (bound state)
(negative prob. for the existence of V)

S-matrix : non-unitary

$P \to \infty$ なら g_{exp} のどの値に対しても ghost が出る.

Lehmann: (Landau)

Q.E.D.

$$M_G \sim m_e \exp\left(\frac{2\pi}{\alpha}\right)$$

Chew-Low

$$f_0^2 = f^2 + \int_1^\infty \frac{dE\,\sigma(E)}{q_E v^2(q_E)^2}$$

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pv. $\begin{cases} f^2 = 0.08 \\ q_{max} = 6.7\,\mu \end{cases}$ 　　glast?

Thirring

Anderson
causality

Landau
Pomeranchuk

Tamm

Bethe

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