湯川： 非線型場の量子化　　　　　　Nov. 16, 1955

線型場の量子化

$$[\varphi(x), \varphi(x')] = i \Delta(x-x')$$

$$\varphi(x) = \int a(k_\mu) \exp i k_\mu x_\mu \, \delta(k_\mu k_\mu + \kappa^2) d^4k$$

$$[a(k_\mu), a(-k_\mu')] = \delta(k_\mu, k_\mu')$$

$$\text{etc.}$$

非線型場

$$F\left(\varphi, \frac{\partial \varphi}{\partial x_\mu}, \frac{\partial^2 \varphi}{\partial x_\mu \partial x_\nu}, \cdots \right) = 0$$

etc.　　φ : operator

場の理論と量子力学の違い。

量子力学　　　　Fock space (non-rel.)

$\varphi(x) \longrightarrow$

operator
$$\Psi_0$$
$$\Psi_1(x)$$
$$\Psi_2(x, x')$$
$$\vdots$$
$$\vdots$$
$$\vdots$$

$\longrightarrow$　Feynman amplitude
(relat.)
(particle, anti-particle)

Foreground → classical field eq.