Researchn Istitute for Fundamental Physics
Kyoto University

(F. 1)

$$\sum\int L_{\alpha\beta}(x,x')\varphi_\beta(x')\,dx' + \sum\int\cdots\int G_{\alpha\beta\gamma\ldots}(x,x',x'',\ldots) f_{\beta\gamma\ldots}(x',x'',\ldots) \times dx'dx''\ldots\ldots$$

$$= 0$$

$$\varphi_\beta \to \varphi: \quad L_{\alpha\beta}(x,x') \to \delta^{(\mu\mu)}(x-x') - \kappa^2\delta(x-x')$$

$$\to \Box - \kappa^2$$

$$G_{\alpha\beta\gamma}(x,x',x'') \to g\,\delta(x-x')\,\delta(x-x'')$$

$$f_{\beta\gamma\ldots}(x',x''\ldots) \to \varphi(x')\varphi(x'')$$

$$\cancel{\sum\int K_{\alpha\beta}(x,x')L_{\beta\gamma}(x',x'') = \delta_{\alpha\gamma}\,\delta(x-x'')}$$

$$\varphi_\alpha(x) + \sum\int K_{\alpha\beta}(x,x')G_{\beta\gamma\ldots}(x',x''\ldots)f_{\gamma\ldots}(x''\ldots)$$

$$= \varphi_\alpha^{(0)}(x)$$

$$\sum\int L_{\alpha\beta}(x,x')\varphi_\beta(x') + \sum\int L_{\alpha\beta}(x,x')K_{\beta\gamma}(x',x'') G_{\gamma\delta\ldots}(x'',x'''\ldots)f_{\delta\ldots}(x'''\ldots)$$

$$= \sum\int L_{\alpha\beta}(x,x')\varphi_\beta^{(0)}(x') = 0$$

$$\sum\int L_{\alpha\beta}(x,x')K_{\beta\gamma}(x',x'') = \delta_{\alpha\gamma}\,\delta(x-x'')$$

$$[\varphi_\alpha^{(0)}(x),\ \varphi_\beta^{(0)}(x')] = i\,\delta_{\alpha\beta}\,\Delta(x-x')$$

$$[\varphi_\alpha(x) + \sum\int K_{\alpha\beta}(x,x')G_{\beta\gamma\ldots}(x',x''\ldots)f_{\gamma\ldots}(x''\ldots),$$
$$\varphi_\lambda(y) + \sum\int K_{\lambda\mu}(y,y')G_{\mu\nu\ldots}(y',y''\ldots)f_{\nu\ldots}(y''\ldots)]$$
$$= i\,\delta_{\alpha\lambda}\,\Delta(x-y)$$

No. 5, 1954. 11. 20,000

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$$[\varphi_\alpha(x), \varphi_\lambda(y)] + \Sigma\int K_{\lambda\mu}(y,y') G_{\mu\nu..}(y', y''..) \times [\varphi_\alpha(x), f_{\nu..}(y''..)]$$

$$+ \Sigma\int K_{\alpha\beta}(x,x') G_{\beta\gamma..}(x', x''..) [f_{\gamma..}(x''..), \varphi_\lambda(y)]$$

$$+ \Sigma\int K_{\alpha\beta}(x,x') G_{\beta\gamma}(x') K_{\lambda\mu}(y,y') G_{\mu\nu..}(y', y''..)$$

$$\times [f_{\gamma..}(x'',..), f_{\nu..}(y''..)]$$

$$= i\,\delta_{\alpha\lambda}\Delta(x-y)$$

applicability of method of successive approximation

$$\varphi_\alpha(x) = \varphi_\alpha^{(0)}(x) + \varphi_\alpha^{(1)}(x) + \cdots$$

$$\varphi_\alpha^{(1)}(x) + \Sigma\int K_{\alpha\beta}(x,x') G_{\beta\gamma..}(x'; x''..) f_{\gamma..}^{(0)}(x'',..) = 0$$

$$\cdots\cdots$$

~~Elim~~ Separation of over-all effects
ambiguity in linear terms

$$L'_{\alpha\beta} = L_{\alpha\beta} + M_{\alpha\beta}$$

$$\Sigma\int L'_{\alpha\beta}(x,x')\varphi_\beta(x') + \Sigma\int\Sigma G'^{(j)}_{\alpha\beta\gamma\ldots}(x,x',x''..) \times f^{(j)}_{\beta\gamma\ldots}(x', x''\ldots) = 0$$

$$G^{(1)}_{\alpha\beta\gamma\ldots}(x,x',..) f^{(1)}_{\beta\gamma\ldots}(x',x''..) = G^{(1)}_{\alpha\beta}(x,x')\varphi_\beta(x')$$

$$\rightarrow G'^{(1)}_{\alpha\beta}(x,x')\varphi_\beta(x') : G'^{(1)}_{\alpha\beta} = G^{(1)}_{\alpha\beta} - M^{(1)}_{\alpha\beta}$$

$$K_{\alpha\beta} \rightarrow K'_{\alpha\beta}.$$

No. 5. 1954. 11. 20,000