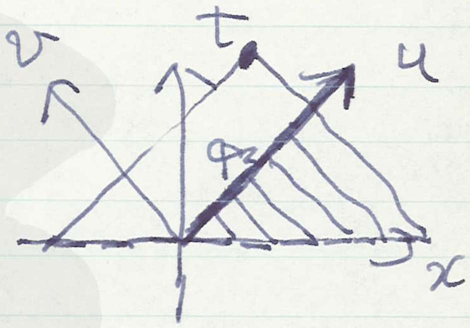
Research Institute for Fundamental Physics
Kyoto University

Solution of Thirring's Field Equations

$$\frac{\partial \psi_1(u,v)}{\partial u} = ig\,\bar\psi_2\psi_2\psi_1$$

$$\frac{\partial \psi_2(u,v)}{\partial v} = -ig\,\bar\psi_1\psi_1\psi_2$$



$$\left.\begin{aligned} u &= x+t \\ v &= x-t \end{aligned}\right\}$$

$$\frac{\partial}{\partial u}(\bar\psi_1\psi_1) = 0 \qquad \bar\psi_1\psi_1(v)$$

$$\frac{\partial}{\partial v}(\bar\psi_2\psi_2) = 0 \qquad \bar\psi_2\psi_2(u)$$

$$\frac{1}{\psi_1(u,v)}\frac{\partial \psi_1(u,v)}{\partial u} = \quad \varphi_1(v) \quad ig\,\bar\psi_2\psi_2(u)\,\psi_1(u,v)$$

$$\psi_1(u,v) \underbrace{\quad}_{=\varphi_1(v)} \exp\left\{ig\int \bar\psi_2\psi_2(u)\,du\right\}$$

$$\psi_2(u,v) = \varphi_2(u)\exp\left\{-ig\int \bar\psi_1\psi_1(v)\,dv\right\}$$

$$\bar\psi_1\psi_1 = \bar\varphi_1\varphi_1$$

$$\psi_1(u,v) = \varphi_1(v)\exp\left\{ig\int \bar\varphi_2\varphi_2(u)\,du\right\}$$

$$\psi_2(u,v) = \varphi_2(u)\exp\left\{-ig\int \bar\varphi_1(v)\varphi_1(v)\,dv\right\}$$

$$\int_{u_0}^{u_1} \bar\varphi_2(x+t)\,\varphi_2(x+t)\,d(x+t)$$

$$\sim \int_{x_0+t_0}^{x_1+t_1} \bar\varphi_2(x')\,\varphi_2(x')\,dx'$$

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