

Title: PSI 2017/2018 - String Theory - Lecture 12

Date: Mar 07, 2018 10:15 AM

URL: <http://pirsa.org/18030018>

Abstract:

$$\psi' = F(u, \theta) = F_1(u) + \theta F_2(u)$$

$$\theta' = G(u, \theta) = G_1(u) + \theta G_2(u)$$

$$D_0 = \mathcal{I} D_{\theta'}$$

SUPER-DIFF

$$v_f = f(u) (\partial_0 - \theta \partial_u)$$

$$\{v_f, D_0\} = f \theta D_0$$

$$\{v_f, v_g\} = -2fg \partial_u - (f\dot{g} + \dot{f}g) \theta \partial_0$$

S DIFF - INVARIANT ACTIONS ?

NEED METRIC + GRAVITINO

$$S[\chi, \psi, e, \chi]$$

S DIFF - INVARIANT

$$\Downarrow \text{GAUGE-FIX}$$
$$S[\chi, \psi, \tau, \chi]$$

$$y(u, \theta) = x(u) + \theta \psi(u)$$

$$[\hat{Q}, \hat{y}] = \psi^u - \theta p^u = [\partial_0 - \theta \partial_u] \psi^u$$

$$v_f(y(u, \theta)) = f(u) \psi - f(u) \dot{x}_0$$

$$(\partial_0 - \theta \partial_u)^2 \approx \partial_u$$

$$D_0 = (\partial_0 + \theta \partial_u) \quad D_0^2 = \partial_u$$

$$\delta_f x = f \psi$$

$$\delta_f \psi = -f \dot{x}$$

$$\int d\omega e^{-1} \dot{\chi}^2 + \int d\omega e^{-1} \psi \bar{\psi} + \int d\omega \dot{\chi} \chi \psi$$

$$\swarrow \delta_f \quad 2e^{-1} \dot{\chi} (f\psi) + (\delta_f e^{-1}) \dot{\chi}^2$$

$$\delta_f e^{-1} = -f \chi \quad \delta_f \chi = f \partial_\omega e^{-1} + \dot{f} e^{-1}$$

$$\begin{array}{c} \downarrow \text{EVEN} \quad \downarrow \text{ODD} \end{array} \rightarrow \int d\tau d\zeta \, G(x_i, x_f; \tau, \zeta) \quad \text{SDIFF}$$

$$\begin{array}{l} z, \Theta \\ \bar{z}, \bar{\Theta} \end{array} \quad \begin{array}{l} z \rightarrow z'(z, \Theta) \\ \bar{z} \rightarrow \bar{z}'(\bar{z}, \bar{\Theta}) \end{array} \quad \begin{array}{l} \Theta \rightarrow \Theta'(z, \Theta) \\ \bar{\Theta} \rightarrow \bar{\Theta}'(\bar{z}, \bar{\Theta}) \end{array}$$

PRESERVING $D_\Theta = \partial_\Theta + \Theta \partial_z$

$$Y^\mu(z, \Theta; \bar{z}, \bar{\Theta}) = X^\mu + \Theta \psi^\mu + \bar{\Theta} \bar{\psi}^\mu$$

b, c

β, γ

$\begin{array}{c} \tau \\ \zeta \end{array}$

$\begin{array}{c} \bar{\tau} \\ \bar{\zeta} \end{array}$

$$L = \frac{1}{2} \dot{x}^\mu \dot{x}_\mu + \psi^\mu \dot{\psi}_\mu$$

$$[\hat{x}^\mu, \hat{p}_\nu] = i \delta^\mu_\nu$$

$$\{\hat{\psi}^\mu, \hat{\psi}^\nu\} = \eta^{\mu\nu}$$

$$\gamma^\mu \equiv \hat{\psi}^\mu$$

$$\hat{H} = p^2$$

$$\hat{Q} = p_\mu \psi^\mu$$

SUPER-TRANSLATIONS

$$[\hat{H}, \hat{Q}] = 0$$

$$\hat{Q}^2 = \hat{H}$$

$$\mathcal{H} \ni |\alpha\rangle$$

$$\hat{\psi}^\mu |\alpha\rangle = (\gamma^\mu)^\mu_\nu |\beta\rangle$$

$$[\hat{Q}, x] = \psi$$

$$[\hat{Q}, \psi] = p$$

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1 FERMIONS

WORLDLINES

• $\frac{P_m \gamma^m}{P^2}$ FROM INTEGRAL OVER PROPER TIME

• $P^2 |PHYSICAL\rangle = 0 \Rightarrow P^m \gamma_m |PHYSICAL\rangle = 0$
 $P^m \psi_m = 0$

• HOW TO GET γ^m ?

$$\psi \rightarrow \psi' \left(\frac{dz'}{dz} \right)^{\frac{1}{2}}$$

1)

2

$$\frac{1}{P^2} = \int d\tau e^{-\tau P^2} \rightarrow \int d\tau G(x_i, x_f, \tau) \rightarrow \int d\tau \int Dx e^{S(x, \tau)}$$

$$\downarrow$$

$$\int d\tau \int \frac{Dx D\epsilon}{\text{DIFF}} e^{S(x, \epsilon)}$$

$$\frac{P_{\mu\nu}}{P^2} = \int d\tau d\zeta e^{-\tau P^2 + \zeta P_{\mu\nu}} = \int d\tau d\zeta e^{-\tau \hat{H} - \zeta \hat{Q}}$$

$$\downarrow \text{EVEN} \quad \downarrow \text{ODD} \quad \rightarrow \int d\tau d\zeta G(x_i, x_f; \tau, \zeta)$$

$$\rightarrow \int d\tau d\zeta \int \frac{D\epsilon}{S \text{ DIFF}}$$

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CAUTION

NO BANG OR LUNGE FROM WITHIN CUBES

PLEASE CONTACT US FOR MORE INFO ON THE BANG

IT IS IMPORTANT TO APPEAL

YOUR RIGHTS PERSONAL ONLY

ATTEND PERSONAL BANG

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 z, θ

$$z \rightarrow z'(z, \theta) \quad \theta \rightarrow \theta'(z, \theta)$$

 $\bar{z}, \bar{\theta}$

$$\bar{z} \rightarrow \bar{z}'(\bar{z}, \bar{\theta}) \dots$$

PRESERVING

$$D_\theta = \partial_\theta + \theta \partial_z$$

$$D_\theta Y^\mu = \psi^\mu - \theta \partial_z X^\mu$$

$$Y^\mu(z, \theta; \bar{z}, \bar{\theta}) = X^\mu + \theta \psi^\mu + \bar{\theta} \bar{\psi}^\mu$$

 b, c

$$\{Q_{BRS}, b\} = T$$

$$\{Q_{BRS}, \beta\} = G$$

$$T = \partial X \partial X + 4 \partial z \bar{T}$$

$$G = \psi \partial X \quad \bar{G}$$

 β, γ

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$$G = \int Dx D\psi e^{-\int_0^T dt \left[\frac{1}{2} \dot{x}^2 + \frac{1}{2} \psi \dot{\psi} + \tau^{-1} \bar{\psi} \psi \dot{x} \right]}$$

$$y(u, \theta) = x(u) + \theta \psi^u(u)$$

$$[\hat{Q}, y^u] = \psi^u - \theta p^u = [\partial_0 - \theta \partial_u] y^u$$

$$(\partial_0 - \theta \partial_u)^2 x = \partial_u$$

$$D_0 = (\partial_0 + \theta \partial_u) \quad D_0^2 = \partial_u$$

$$v_f(y(u, \theta)) = f(u) \psi - f(u) \dot{x} \theta$$

$$\delta_f x = f \psi$$

$$\delta_f \psi = -f \dot{x}$$

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$$\int dv e^{-1} \dot{x}^2 + \int dv e^{-1} \psi \dot{\psi} + \int dv x \chi \psi$$

$$\swarrow \delta_f \quad 2e^{-1} \dot{x} (f\psi) + (\delta_f e^{-1}) \dot{x}^2$$

$$\delta_f e^{-1} = -f\chi \quad \delta_f \chi = f \partial_\nu e^{-1} + \dot{f} e^{-1}$$

$$\int e dv = \tau \quad \int e^2 \chi = 3$$

$$\psi' = F(u, \theta) = F_1(u) + \theta F_2(u)$$

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$$D_0 = \int D_0'$$

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CAUTION

SDIFF - INVARIANT ACTIONS ?

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SDIFF - INVARIANT

$$\Downarrow \text{GAUGE-FIX}$$
$$S[x, \psi, \tau, \zeta]$$

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CAUTION

TO AVOID OR CONTROL THE WEATHER BOARD,
PLEASE CONTACT US THE AROUND OF THE BOARD.