

1407.3844

AdS₃ + higher spin \leftrightarrow CFT₂ + higher spin

CFT₂

$$\bar{\partial} W_S = 0$$

$$\partial^\mu j_\mu = 0$$

$$\delta_{W_S} S = \int \varepsilon^s \bar{\partial} W_S$$

$$\delta_\varepsilon S = \int \varepsilon \partial^\mu j_\mu$$

$$S_{\text{CFT}} + \int d^2z M_S W_S^S$$

$$S + \int A_\mu J^\mu$$

$$\delta M_S = \bar{\partial} \varepsilon_S + \dots$$

$$\delta A_\mu = \partial_\mu \varepsilon + \dots$$



$$\sum M_S^0 W_S^S$$

GGE's

MT

$$\int R_{\alpha\beta} T^{\alpha\beta}$$

$$S = S_0 + \int d^2z \mu_S W^S + \int d^2z \bar{\mu}_S \bar{W}^S +$$

$$H = H_0 + \oint d\sigma \mu_S W^S + \oint d\sigma \bar{\mu}_S \bar{W}^S$$

W^S : closed algebra

$$\langle \partial\phi \partial\bar{\phi} / \partial\phi \partial\bar{\phi}(w) \rangle$$

$$Z_{\text{CAN}} = \text{tr}_H \left(e^{2\pi i \left[\tau \left(\bar{b} - \frac{c}{24} \right) - \bar{\tau} \left(b - \frac{c}{24} \right) + \sum (a_S W_S^0 - \bar{a}_S \bar{W}_S^0) \right]} \right)$$

$$Z_{\text{CAN}} = \int D\phi Dp e^{\int_{\mathbb{T}^2} d^2z \left[-p\dot{\phi} - H_0 + \sum M_S W_S(p, \phi) + \sum \bar{M}_S \bar{W}_S(p, \phi) \right]}$$

$M_S = i\alpha_S/\beta \quad \beta = 2\pi \text{Im}(\tau)$

$$Z_{\text{LAG}} = \int D\phi e^{-\int_{\mathbb{T}^2} d^2z \left[S_0[\phi] + \sum M_S W_S(\phi) + \sum \bar{M}_S \bar{W}_S(\phi) \right]}$$

Ward identities
with anomalous terms

Solve: (1) rewrite as flatness

conditions for a 2d gauge field

2) on-shell $S_{CS} = \int \delta M_S \langle W_S \rangle$

CAN

LAG

$$\langle \partial_- T - M_2 \partial_\sigma T - T \partial_\sigma M_2 - \frac{c}{12} \partial_\sigma^3 M_2 \rangle = 0$$

Same but $\partial_\sigma \rightarrow \partial_+$

CAN

LAG

$$\Rightarrow a_z + a_{\bar{z}} = \Lambda^+ + w, \quad a_{\bar{z}} = M + \dots \quad (-a_z)$$

$$\Rightarrow a_z = \Lambda^+ + w, \quad a_{\bar{z}} = M + \dots$$

higher spin algebra \leftrightarrow hamiltonian reduction

$$a_1 = \begin{pmatrix} 0 & 1 & 0 \\ T & 0 & 1 \\ W & T & 0 \end{pmatrix}$$

Λ^+

$$a_2 = \begin{pmatrix} * & M_2 + * & M_3 \\ * & * & M_2 - * \\ * & * & * \end{pmatrix}$$

$$(sl_2 = \mathfrak{so}_2)$$

$$F(a_1, a_2) = 0 \iff \text{Ward-identity } \checkmark$$

CAN \Leftrightarrow

$$S_{CS} + k \int_{\partial M} \text{Tr} \left((a_2 + a_{\bar{2}} - 2\Lambda^+) a_{\bar{2}} \right)$$

$$SS = \int \delta \mu_S \langle W_S \rangle$$

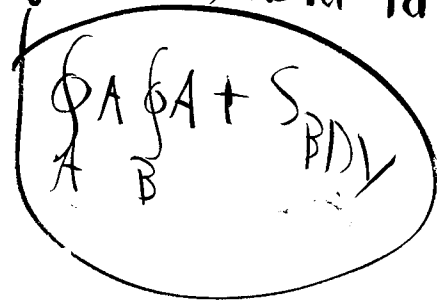
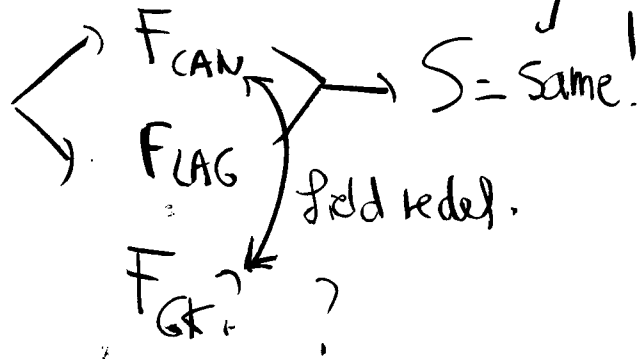
LAG \Leftrightarrow

$$S_{CS} + k \int_{\partial M} \text{Tr} \left((a_2 - 2\Lambda^+) a_{\bar{2}} \right)$$

any soln of CS \rightarrow weird id's.

Free energy

entropy.



mod. trials
are easy in
LAG

- No FIELD REDEF

- entropy is nice in CAN

$$\begin{pmatrix} 0 & 1 & 0 \\ 6 & 0 & 1 \\ w_0 & 6 & 0 \end{pmatrix}$$