Fabrizio del Monte

- 6d $\mathcal{N}=(0,2)$ SCFT $\mathcal{S}$, g Lie alg

$$\mathcal{S}(g) \xrightarrow{\text{cptfy } S^1} \text{5d SYM } g$$

$$D \downarrow C_{g,n}$$

$$\mathcal{S}(g, C_{g,n}, D)$$

- data D at regular puncture z_k: (sl_2) $\vec{\vartheta} = (\vartheta, -\vartheta)$

  $U(1)^r$, r cpx str.

  $\downarrow$ cptfy S^1

  NLSM: $\mathbb{R}^{2,1} \to \mathcal{M}_{SW}$

  $D \downarrow C_{g,n}$

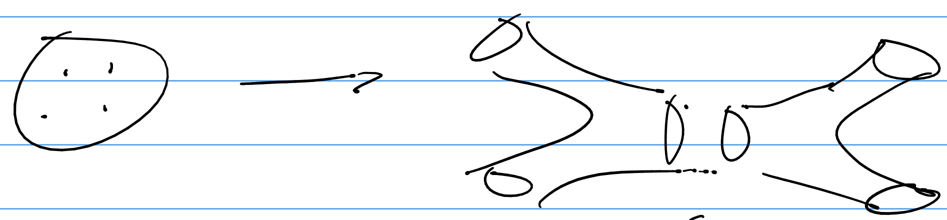
  NSLM: $\mathbb{R}^{2,1} \to \mathcal{M}$

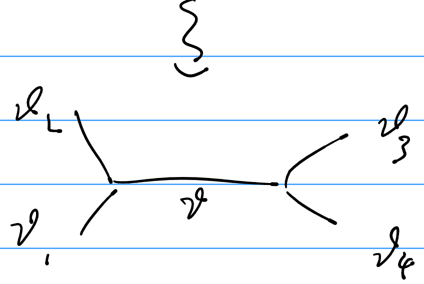
  - has to be Seiberg-Witten
  - but explicitly from this side

$$\begin{cases} F + R^2 [\varphi, \bar{\varphi}] = 0 \\ \bar{D}_A \varphi = 2\pi i \sum_k \vec{\vartheta}_k \, \delta(z - z_k) \end{cases}$$

HITCHIN eqns

- In explicita for 4-punctured S^2,





- from now on put $\varphi \mapsto L$, since we work w/ int. systems (L Lax matrix)

- $\partial_z Y = L Y$
- $C_{0,n}$ $L = \sum_k \frac{A_k}{z - z_k}$, $A_k \sim \begin{pmatrix} \vartheta_k & \\ & -\vartheta_k \end{pmatrix}$

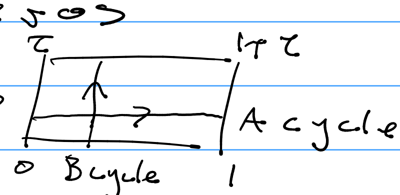
$$Y(\gamma_k z) = Y(z) M_k, \quad M_1 \cdots M_n = \mathbb{1},$$

M_k representation of fund. group

- $C_{1,n}$, we don't have functions w/ perscribed simple zeros

used some freedom to eliminate A cycle twist

$\mathbb{T}^2 \rightsquigarrow$



A cyc: $L(z+1) = L(z)$

B cyc: $L(z+\tau) = T_B L(z) T_B^{-1}$

where

notation

$$T_B : \mathrm{diag}(e^{2\pi i Q_i}) \overset{!}{=} e^{2\pi i \vec{Q}},$$

$\sum Q_i = 0$

$\vec{Q} = (Q, -Q)$ for sl_2

- $C_{1,1}$: $L(z) = \begin{bmatrix} p & K(2Q,z) \\ K(2Q,z) & -p \end{bmatrix}$

where $K(2Q,z) = \dfrac{\vartheta_1(z-2Q)\,\vartheta_1'(0)}{\vartheta_1(z)\,\vartheta(2Q)}$

- now we not only have monodromies but also T_B twist: $Y(z+\tau) = T_B Y(z) M_B$
- So we need to improve our Riemann-Hilbert problem

$\partial_{z_k} Y = H_k T$ $\quad H_k : \oint_{\gamma_k} \frac{dz}{2\pi i} \frac{1}{2} \mathrm{tr}\, L^2 = \partial_{z_k} \log \tau$

$\partial_\tau Y = H T$

- - - — $\quad \partial_\tau \log \tau$

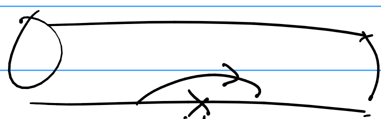
- use N-component fermions $\psi = (\psi_1 \cdots \psi_N)$,

$$\psi(z) = \sum_{n\in\mathbb{Z}} \psi_n e^{2\pi i (n+\vec{Q}) z}$$

$$\Rightarrow \psi(z+1) = \psi(z) e^{2\pi i \vec{Q}}$$

- vertex operators
  - braiding $\psi(z) V_{\vec{\nu}}(0) = V_{\vec{\nu}}(0)\, \psi(\gamma z) B_{\vec{\nu}}$

    $= e^{2\pi i \vec{\nu}}$



$$V : \psi \mapsto V^{-1} \psi V = \psi B$$