

$$\begin{aligned}
{}^{\tau}V &= {}^{\tau i L} \mathfrak{e} V^{-\tau i L} \mathfrak{e} \\
{}^x V &= x^L V x^{-L} \\
L_m \star {}^x V &= \underbrace{x^{m+1} \partial_x + m x^m}_{x^m} {}^x V \\
{}^{\tau}V &= \overbrace{\exp k^{\mu} \eta_{\mu\nu} X^{\nu} + X_0^{\nu} \tau}^{{}^{\tau}k} \mathbf{\Xi} {}^{\tau}V = {}^{\tau}k \mathbf{\Xi} {}^{\tau}V \\
{}^x V &= \overbrace{\exp k^{\mu} \eta_{\mu\nu} X^{\nu} - {}^x \mathcal{X} X_0^{\nu} i}^{{}^x k} \mathbf{\Xi} {}^x V = {}^x k \mathbf{\Xi} {}^x V \\
V &= k \mathbf{\Xi} V \\
x^L V x^{-L} &= \underbrace{x^H \mathbf{\Xi} x^E}_{\text{tachyon}} \underbrace{k \mathbf{\Xi} V}_{k^{\mu} \eta_{\mu\nu} k^{\nu}} \underbrace{x^{-H} \mathbf{\Xi} x^{-E}}_{= 2} = \underbrace{x^H k x^{-H}}_{\text{tachyon}} \mathbf{\Xi} \underbrace{x^E V x^{-E}}_{k^{\mu} \eta_{\mu\nu} k^{\nu} = 2}
\end{aligned}$$

$$(\tau)^k = \mathfrak{e}^{k \cdot X i} \mathfrak{e}^{{}^x \mathcal{X} k \cdot (P + k/2)} \mathbf{\Xi} \bigotimes_n^{\geq 0} \mathfrak{e}^{x^n k \cdot \partial_n^*} \mathfrak{e}^{-x^{-n} k \cdot \partial_n}$$

$$\begin{aligned}
{}^{\tau}k &= \overbrace{\tau X | k i}^{\mathfrak{e}} = \underbrace{\exp k^{\mu} \eta_{\mu\nu} X^{\nu} + P^{\nu} \tau}_{\mathbf{\Xi}} \mathbf{\Xi} \overbrace{\exp \sum_{n>0}^{\frac{1}{\sqrt{n}}} \mathfrak{l}_n \mathbf{\Xi} k^{\mu} \eta_{\mu\nu}^* \partial^{\nu} \tau i \mathfrak{e}^n \mathbf{\Xi} \mathfrak{l}_n}^{\text{RHS}} \exp - \sum_{n>0}^{\frac{1}{\sqrt{n}}} \mathfrak{l}_n \mathbf{\Xi} k^{\mu} \eta_{\mu\nu} \partial^{\nu} - \tau i \mathfrak{e}^n \mathbf{\Xi} \mathfrak{l}_n \\
&= {}^{k \cdot X i} \mathfrak{e} x^{k \cdot (P + k/2)} \mathbf{\Xi} \bigotimes_n^{\geq 0} \exp \underbrace{k^{\mu} \eta_{\mu\nu} \frac{\partial^* \nu}{\sqrt{n}} \tau i \mathfrak{e}^n}_{\text{RHS}} \exp - \underbrace{k^{\mu} \eta_{\mu\nu} \frac{\partial^{\nu}}{\sqrt{n}} - \tau i \mathfrak{e}^n}_{\text{RHS}} = \text{RHS}
\end{aligned}$$

$$\begin{aligned}
x &= {}^{\tau i} \mathfrak{e} \\
{}^x k &= \overbrace{{}^x X | k i}^{\mathfrak{e}} = \underbrace{\exp k^{\mu} \eta_{\mu\nu} X^{\nu} - {}^x \mathcal{X} P^{\nu} i}_{\mathbf{\Xi}} \mathbf{\Xi} \bigotimes_n^{\geq 0} \overbrace{\exp \sum_{n>0}^{\frac{1}{\sqrt{n}}} k^{\mu} \eta_{\mu\nu}^* \partial^{\nu} x^n \mathfrak{e}^n \mathbf{\Xi} \mathfrak{l}_n}^{\text{RHS}} \exp - \sum_{n>0}^{\frac{1}{\sqrt{n}}} k^{\mu} \eta_{\mu\nu} \partial^{\nu} x^{-n} \mathfrak{l}_n \\
{}^0 k &= \overbrace{{}^0 X | k i}^{\mathfrak{e}} = \exp k^{\mu} \eta_{\mu\nu} X^{\nu} \mathbf{\Xi} \bigotimes_n^{\geq 0} \overbrace{\exp \sum_{n>0}^{\frac{1}{\sqrt{n}}} k^{\mu} \eta_{\mu\nu}^* \frac{\partial^* \nu}{\sqrt{n}} \mathfrak{e}^n \mathbf{\Xi} \mathfrak{l}_n}^{\text{RHS}} \exp - \sum_{n>0}^{\frac{1}{\sqrt{n}}} k^{\mu} \eta_{\mu\nu} \frac{\partial^{\nu}}{\sqrt{n}} \mathfrak{e}^n \mathbf{\Xi} \mathfrak{l}_n \\
\text{directon } k^{\mu} \eta_{\mu\nu} k^{\nu} &= \zeta^{\mu} \eta_{\mu\nu} k^{\nu} = 0 \\
\widetilde{k|\zeta} &= \zeta | dX^X | k i \mathfrak{e} = \underbrace{\zeta | \widetilde{\partial_{\tau} X} {}^z X | k i}_{\text{unbroken symm } n = -1:0:1} \mathfrak{e}
\end{aligned}$$

$${}^{tL_n}\!{\mathfrak e} \ {}^y\!V \ {}^{y^n - tL_n}{\mathfrak e} = {}^{y \cdot g}\!V \ {}^y\underline{g}^n$$

$$\frac{{}^y\!V}{y}=\sqrt[2]{a-cg\cdot y}\,\frac{{}^{g\cdot y}\!V}{g\cdot y}$$