

$$\begin{aligned}
(\tau)^k &= \underset{n < 0}{\otimes} \mathfrak{e}^{\bar{z}nk/2 \cdot \hat{\partial}_n} \mathfrak{e}^{-\bar{z}-nk/2 \cdot \partial_n} \mathbf{X} \mathfrak{e}^{k \cdot Xi} \mathfrak{e}^{x \times k \cdot (P + k/2)} \mathbf{X} \underset{n > 0}{\otimes} \mathfrak{e}^{znk/2 \cdot \hat{\partial}_n} \mathfrak{e}^{-z-nk/2 \cdot \partial_n} \\
{}^\tau V &= {}^\tau L_0 i \mathfrak{e} {}^0 V {}^{-\tau L_0 i} \mathfrak{e} \\
{}^z \underline{V} &= {}^z \underline{z}^L \underline{V} {}^z \underline{z}^{-L} \\
{}^z \bar{V} &= {}^z \bar{z}^L \bar{V} {}^z \bar{z}^{-L} \\
\underline{L}_m * {}^z \underline{V} &= \underbrace{z^{m+1} \underline{\partial}}_{\underline{z}^m} + m \underline{z}^m {}^z \underline{V} \\
\bar{L}_m * {}^z \bar{V} &= \underbrace{\bar{z}^{m+1} \bar{\partial}}_{\bar{z}^m} + m \bar{z}^m {}^z \bar{V} \\
{}^\tau V &= \int_{d\sigma/\pi}^{0|\pi} {}^{\tau-\sigma} \underline{V} \mathbf{X} {}^{\tau+\sigma} \bar{V} = \int_{d\sigma/\pi}^{0|\pi} -2i\sigma \mathfrak{e}^L \mathbf{X}^{\bar{i}} - \underline{i} \mathbf{X}^{\bar{L}} \underbrace{{}^\tau \underline{V} \mathbf{X}^{\tau} \bar{V}}_{2i\sigma \mathfrak{e}^L \mathbf{X}^{\bar{i}} - \underline{i} \mathbf{X}^{\bar{L}}} \\
&= \int_{d\sigma/\pi}^{0|\pi} \underbrace{-2\sigma i \mathfrak{e}^L \mathbf{X}^{2\sigma i} \mathfrak{e}^{\bar{L}}}_{\mathfrak{e}^L \mathbf{X}^{2\sigma i} \mathfrak{e}^{\bar{L}}} \underbrace{\tau i \mathfrak{e}^L \underline{V}^{-\tau i} \mathfrak{e}^L \mathbf{X}^{\bar{i}}}_{\underline{i} \mathbf{X}^{\bar{L}} \mathfrak{e}^{\bar{L}} \underline{V}^{-\tau i} \mathfrak{e}^{\bar{L}}} \underbrace{\underline{i} \mathbf{X}^{\tau i} \mathfrak{e}^{\bar{L}} \bar{V}^{-\tau i} \mathfrak{e}^{\bar{L}}}_{2\sigma i \mathfrak{e}^L \mathbf{X}^{-2\sigma i} \mathfrak{e}^{\bar{L}}} \\
&= \int_{d\sigma/\pi}^{0|\pi} \underbrace{-2\sigma i \mathfrak{e}^L \tau i \mathfrak{e}^L}_{\mathfrak{e}^L \tau i \mathfrak{e}^L} \mathbf{X} \underbrace{2\sigma i \mathfrak{e}^{\bar{L}} \tau i \mathfrak{e}^{\bar{L}}}_{\mathfrak{e}^{\bar{L}} \tau i \mathfrak{e}^{\bar{L}}} \underbrace{\underline{V} \mathbf{X} \bar{V}}_{\mathfrak{e}^L \mathbf{X}^{\bar{L}} \mathfrak{e}^{\bar{L}}} \underbrace{\tau i \mathfrak{e}^{\bar{L}} 2\sigma i \mathfrak{e}^L}_{\mathfrak{e}^{\bar{L}} 2\sigma i \mathfrak{e}^L} \mathbf{X} \underbrace{\tau i \mathfrak{e}^{\bar{L}} 2\sigma i \mathfrak{e}^{\bar{L}}}_{\mathfrak{e}^{\bar{L}} 2\sigma i \mathfrak{e}^{\bar{L}}} \\
&= \int_{d\sigma/\pi}^{0|\pi} \underbrace{(\tau - 2\sigma) i \mathfrak{e}^L \mathbf{X}^{(2\sigma - \tau) i} \mathfrak{e}^{\bar{L}}}_{(\tau - 2\sigma) i \mathfrak{e}^L \mathbf{X}^{(2\sigma - \tau) i} \mathfrak{e}^{\bar{L}}} \underbrace{\underline{V} \mathbf{X} \bar{V}}_{\mathfrak{e}^L \mathbf{X}^{\bar{L}}} \underbrace{(2\sigma - \tau) i \mathfrak{e}^L \mathbf{X}^{(\tau + 2\sigma) i} \mathfrak{e}^{\bar{L}}}_{(2\sigma - \tau) i \mathfrak{e}^L \mathbf{X}^{(\tau + 2\sigma) i} \mathfrak{e}^{\bar{L}}} \\
{}^\tau k &= \underbrace{{}^{\tau X|ki} \mathfrak{e}}_{1 \mathbf{X} \exp \sum_{n \geq 1} k^\mu_{\mu\nu} \eta X^\nu_{-\mathbb{N}} \mathfrak{e}^n \mathbf{X}^{\bar{i}} \exp \overbrace{k^\mu_{\mu\nu} \eta X^\nu + \tau X^\nu_0}^{\mathbf{X} \iota \mathbf{X}^{\bar{i}}} 1 \mathbf{X} \iota \mathbf{X} \exp \overbrace{-\sum_{n \geq 1} k^\mu_{\mu\nu} \eta X^\nu_{\mathbb{N}} \mathfrak{e}^n}^{\mathbf{X} \iota \mathbf{X}^{\bar{i}}}} = \exp \overbrace{k^\mu_{\mu\nu} \eta X^\nu + \tau X^\nu_0}^{\mathbf{X} \exp \frac{1}{2} \sum_{n \geq 1} k^\mu_{\mu\nu} \eta Z^\nu_{-\mathbb{N}} \mathfrak{e}^n} \mathbf{X} \exp \overbrace{-\frac{1}{2} \sum_{n \geq 1} k^\mu_{\mu\nu} \eta \bar{Z}^\nu_{\mathbb{N}} \mathfrak{e}^n}^{\mathbf{X} \exp \frac{1}{2} \sum_{n \geq 1} k^\mu_{\mu\nu} \eta Z^\nu_{-\mathbb{N}} \mathfrak{e}^n} \\
&= \exp \overbrace{k^\mu_{\mu\nu} \eta X^\nu + \tau X^\nu_0}^{\mathbf{X} \exp \frac{1}{2} \sum_{n \geq 1} k^\mu_{\mu\nu} \eta Z^\nu_{-\mathbb{N}} \mathfrak{e}^n} \mathbf{X} \exp \overbrace{-\frac{1}{2} \sum_{n \geq 1} k^\mu_{\mu\nu} \eta \bar{Z}^\nu_{\mathbb{N}} \mathfrak{e}^n}^{\mathbf{X} \exp \frac{1}{2} \sum_{n \geq 1} k^\mu_{\mu\nu} \eta Z^\nu_{-\mathbb{N}} \mathfrak{e}^n} \\
\text{dilaton } {}^z k &= \underbrace{\partial X^\mu_{\mu\nu} \eta \bar{\partial} X^{\nu z X|ki} \mathfrak{e}}_{:} : k^\mu_{\mu\nu} \eta k^\nu = 0 \\
\text{graviton } {}^z \widehat{G:k} &= \underbrace{\partial X^\mu_{\mu\alpha} \eta G^{\alpha\beta} \eta \bar{\partial} X^{n^z X|ki} \mathfrak{e}}_{:} : k^\mu_{\mu\nu} \eta k^\nu = 0 : G^{\mu\lambda} \eta k^\nu = 0 \\
\text{matrixon } {}^z \widehat{A:k} &= \underbrace{\partial X^\mu_{\mu\alpha} \eta A^{\alpha\beta} \eta \bar{\partial} X^{\nu^z X|ki} \mathfrak{e}}_{:} : k^\mu_{\mu\nu} \eta k^\nu = 0 : A^{\mu\lambda} \eta k^\nu = 0 \\
&\quad \text{unbroken symm } n = -1:0:1
\end{aligned}$$

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

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