

Ginsparg

$$\alpha\beta \begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right] \end{matrix} = \sum_n^{\mathbb{Z}} \exp \pi i \left(\overbrace{n + \alpha/2 + \downarrow}^2 + \underbrace{2n + \alpha}_{\downarrow} \underbrace{\uparrow + \beta/2}_{\uparrow} + \downarrow \uparrow \right)$$

$$= \sum_n^{\mathbb{Z}} \pi i \left(\overbrace{n + \alpha/2 + \downarrow}^2 + \underbrace{2n + \alpha}_{\downarrow} \underbrace{\uparrow + \beta/2}_{\uparrow} + \downarrow \uparrow \right)$$

$$\begin{matrix} \tau+1 \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{00} \end{matrix} = \begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \downarrow + \uparrow \end{matrix} \right]_{01} \end{matrix}$$

$$\begin{matrix} \tau+1 \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{01} \end{matrix} = \begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \downarrow + \uparrow \end{matrix} \right]_{00} \end{matrix}$$

$$\begin{matrix} \tau+1 \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{10} \end{matrix} = \sqrt{i} \begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \downarrow + \uparrow \end{matrix} \right]_{10} \end{matrix}$$

$$\begin{matrix} \tau+1 \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{11} \end{matrix} = \sqrt{i} \begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \downarrow + \uparrow \end{matrix} \right]_{11} \end{matrix}$$

$$\begin{matrix} -1/\tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{00} \end{matrix} = \sqrt{-i\tau} \begin{matrix} \tau \\ \left[\begin{matrix} \uparrow \\ -\downarrow \end{matrix} \right]_{00} \end{matrix}$$

$$\begin{matrix} -1/\tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{01} \end{matrix} = \sqrt{-i\tau} \begin{matrix} \tau \\ \left[\begin{matrix} \uparrow \\ -\downarrow \end{matrix} \right]_{10} \end{matrix}$$

$$\begin{matrix} -1/\tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{10} \end{matrix} = \sqrt{-i\tau} \begin{matrix} \tau \\ \left[\begin{matrix} \uparrow \\ -\downarrow \end{matrix} \right]_{01} \end{matrix}$$

$$\begin{matrix} -1/\tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{11} \end{matrix} = -i\sqrt{-i\tau} \begin{matrix} \tau \\ \left[\begin{matrix} \uparrow \\ -\downarrow \end{matrix} \right]_{11} \end{matrix}$$

$$\begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{00} \end{matrix}^4 + \begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{11} \end{matrix}^4 = \begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{01} \end{matrix}^4 + \begin{matrix} \tau \\ \left[\begin{matrix} \downarrow \\ \uparrow \end{matrix} \right]_{10} \end{matrix}^4$$