

1312.3824.13.

13. The standard representation is related to Weyl rep. by

$$\gamma_{\text{weyl}} \rightarrow \gamma_{\text{std}} = \frac{1}{\sqrt{2}} \begin{pmatrix} I & I \\ I & -I \end{pmatrix}.$$

$$\text{since } \left[ \frac{1}{\sqrt{2}} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} \right]^{-1} = \frac{1}{\sqrt{2}} \begin{pmatrix} I & I \\ I & -I \end{pmatrix},$$

We apply a similarity transformation on Weyl basis to find the standard basis:

$$\gamma^\mu \rightarrow \frac{1}{\sqrt{2}} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} \gamma^\mu \frac{1}{\sqrt{2}} \begin{pmatrix} I & I \\ I & -I \end{pmatrix}$$

$$= \frac{1}{2} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} \gamma^\mu \begin{pmatrix} I & I \\ I & -I \end{pmatrix}.$$

$$\gamma^0 \rightarrow \frac{1}{2} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} \begin{pmatrix} 0 & I \\ I & 0 \end{pmatrix} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} = \frac{1}{2} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} \begin{pmatrix} I & -I \\ I & I \end{pmatrix}$$

$$= \frac{1}{2} \begin{pmatrix} 2I & 0 \\ 0 & -2I \end{pmatrix} = \begin{pmatrix} I & \\ & -I \end{pmatrix}.$$

$$\vec{\gamma} \rightarrow \frac{1}{2} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} \begin{pmatrix} 0 & -\vec{\sigma} \\ \vec{\sigma} & 0 \end{pmatrix} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} = \frac{1}{2} \begin{pmatrix} I & I \\ I & -I \end{pmatrix} \begin{pmatrix} -\vec{\sigma} & \vec{\sigma} \\ \vec{\sigma} & \vec{\sigma} \end{pmatrix}$$

$$= \frac{1}{2} \begin{pmatrix} 0 & 2\vec{\sigma} \\ -2\vec{\sigma} & 0 \end{pmatrix} = \begin{pmatrix} & \vec{\sigma} \\ \vec{\sigma} & \end{pmatrix}.$$