

Addendum.

## 1. The mechanism's links to the Standard Model.

**1.1.** The first item to be considered in this context is neutral current, which is mediated by  $Z$ -boson ( $\gamma$ - photon behavior is analog to it).

Column vector for neutral currents is denoted as follows:

$$\begin{bmatrix} Z \\ \gamma \end{bmatrix}$$

The second item to be considered is charged current, which is mediated by  $W^+$ ,  $W^-$  bosons. Column vector for charged currents is denoted as follows:

$$\begin{bmatrix} W^+ \\ W^- \end{bmatrix}$$

Neutral to charged column vectors can be mapped as follows:

$$\begin{bmatrix} Z \\ \gamma \end{bmatrix} \mapsto \begin{bmatrix} W^+ \\ W^- \end{bmatrix} \Rightarrow \begin{bmatrix} Z \\ \gamma \end{bmatrix} = W^0 \begin{bmatrix} e^{i\varphi^+} \\ e^{i\varphi^-} \end{bmatrix} \quad (\text{C 12.1})$$

where

$W^0$  (complex) charged field multiplier.

The eq. (C 12.1) under the condition:  $\varphi^- = \pi/2 + \varphi^+$  ( $W^-$  antiparticle), will lead to the following:

$$\begin{bmatrix} Z \\ \gamma \end{bmatrix} = \begin{bmatrix} W^0 \cos \varphi^+ + iW^0 \sin \varphi^+ \\ -W^0 \sin \varphi^+ + iW^0 \cos \varphi^+ \end{bmatrix} = \begin{bmatrix} \cos \varphi^+ \sin \varphi^+ \\ -\sin \varphi^+ \cos \varphi^+ \end{bmatrix} \begin{bmatrix} W^0 \\ iW^0 \end{bmatrix} \quad (\text{C 12.2})$$

Eq. (C 12.2) represents the connection between neutral and charged currents.

Since  $\mathbb{C}$  is a 2-dimensional vector space of  $\mathbb{R} \Rightarrow \begin{bmatrix} 1 \\ i \end{bmatrix}$  becomes a basis for  $\mathbb{C}$  over  $\mathbb{R}$  representing charged vector bosons.