Pilaftsis: $\delta m_{ij} = \frac{\alpha_W}{16\pi m_W^2} C_{ki} C_{kj} m_k \times$

$$\left\{ m_k^2 \left(f_{kZ} - f_{kH} \right) - 4 m_Z^2 f_{kZ} \right\}$$

where

$$f_{kZ} = \frac{m_k^2}{m_k^2 - m_Z^2} \ln\left(\frac{m_k^2}{m_Z^2}\right) + \ln\left(\frac{m_Z^2}{\mu}\right) - 1$$

and similar for f_{kH}.

The curly braces contain

$$(m_k^2 - m_Z^2) f_{kZ} - 3 m_Z^2 f_{kZ} - (m_k^2 - m_H^2) f_{kH} - m_H^2 f_{kH}$$

$$= -3 m_Z^2 \left(\frac{m_k^2}{m_k^2 - m_Z^2} \ln \frac{m_k^2}{m_Z^2} + \text{const.} \right)$$

$$- m_H^2 \left(\frac{m_k^2}{m_k^2 - m_H^2} \ln \frac{m_k^2}{m_H^2} + \text{const.} \right)$$

where const. does not depend on k and is filtered out by virtue of

$$C_{ki} C_{kj} m_k = 0$$

If $C = U_L^* U_L^T$ and $U_L = (U_{11}, U_{12})$ then in the seesaw limit $U_{11} \simeq 1$, $U_{12} \simeq m_D^* m_R^{-1}$ with $m_k = m_R$ for heavy neutrinos and $m_k = 0$ for light ones we get

$$(4\pi v)^2 \delta m = m_D^T \left(m_R \left(\frac{3 \ln\left(\frac{m_R^2}{m_Z^2}\right)}{m_R^2 - m_Z^2} + \frac{\ln \frac{m_R^2}{m_H^2}}{m_R^2 - m_H^2} \right) \right) m_D$$

"Lopez-Pavon" $\longrightarrow$

diag. matrix

once we recognise $\frac{\alpha_W}{16\pi m_W^2} = \frac{g^2}{4 \cdot 16 \cdot \pi^2 m_W^2} = \frac{1}{(4\pi v)^2}$