Process	$S\|M\|^2$
$\nu_e + \nu_e \to \nu_e + \nu_e$	$32G_F^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
$\nu_e + \nu_i \to \nu_e + \nu_i$	$32G_F^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
$\nu_e + \bar{\nu}_i \to \nu_e + \bar{\nu}_i$	$32G_F^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
$\nu_e + \bar{\nu}_i \to \nu_i + \bar{\nu}_i$	$32G_F^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
$\nu_e + \bar{\nu}_e \to \nu_e + \bar{\nu}_e$	$128G_F^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
$\nu_e + e^- \to \nu_e + e^-$	$32G_F^2[(C_A + C_V)^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
	$+(C_A - C_V)^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
	$-(C_V^2 - C_A^2)m_e^2(p_1 \cdot p_3)]$
$\nu_e + e^+ \to \nu_e + e^+$	$32G_F^2[(C_A - C_V)^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
	$+(C_A + C_V)^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
	$-(C_V^2 - C_A^2)m_e^2(p_1 \cdot p_3)]$
$\nu_e + \bar{\nu}_e \to e^- + e^+$	$32G_F^2[(C_A + C_V)^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
	$+(C_A - C_V)^2(p_1 \cdot p_3)(p_2 \cdot p_4)$
	$+(C_V^2 - C_A^2)m_e^2(p_1 \cdot p_2)]$

Table (1): Matrix Elements for ν_e as Particle # 1.

Process	$S\|M\|^2$
$\nu_i + \nu_i \to \nu_i + \nu_i$	$32G_F^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
$\nu_i + \nu_j \to \nu_i + \nu_j$	$32G_F^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
$\nu_i + \nu_e \to \nu_i + \nu_e$	$32G_F^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
$\nu_i + \bar{\nu}_j \to \nu_i + \bar{\nu}_j$	$32G_F^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
$\nu_i + \bar{\nu}_e \to \nu_i + \bar{\nu}_e$	$32G_F^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
$\nu_i + \bar{\nu}_i \to \nu_j + \bar{\nu}_j$	$32G_F^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
$\nu_i + \bar{\nu}_i \to \nu_e + \bar{\nu}_e$	$32G_F^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
$\nu_i + \bar{\nu}_i \to \nu_i + \bar{\nu}_i$	$128G_F^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
$\nu_i + e^- \to \nu_i + e^-$	$32G_F^2\{(C_A + C_V - 2)^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
	$+(C_A - C_V)^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
	$-[(C_V - 1)^2 - (C_A - 1)^2]m_e^2(p_1 \cdot p_3)\}$
$\nu_i + e^+ \to \nu_i + e^+$	$32G_F^2\{(C_A - C_V)^2(p_1 \cdot p_2)(p_3 \cdot p_4)$
	$+(C_A + C_V - 2)^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
	$-[(C_V - 1)^2 - (C_A - 1)^2]m_e^2(p_1 \cdot p_3)\}$
$\nu_i + \bar{\nu}_i \to e^- + e^+$	$32G_F^2\{(C_A + C_V - 2)^2(p_1 \cdot p_4)(p_2 \cdot p_3)$
	$+(C_A - C_V)^2(p_1 \cdot p_3)(p_2 \cdot p_4)$
	$+[(C_V - 1)^2 - (C_A - 1)^2]m_e^2(p_1 \cdot p_2)\}$

Table (2): Matrix Elements for ν_μ, ν_τ as Particle # 1.