

# Z<sup>0</sup> electroweak couplings

left and right handed, **vector** and **axial** couplings :

$$P |H_L\rangle = - |H_R\rangle \quad P |L+R\rangle = - |L+R\rangle = P |V\rangle$$

$$P |H_R\rangle = - |H_L\rangle \quad P |L-R\rangle = + |L-R\rangle = P |A\rangle$$

$$g_L = I_3 - Q s_w^2$$

$$g_R = - Q s_w^2$$

$$g_V = g_L + g_R = I_3 - 2Q s_w^2$$

$$g_A = g_L - g_R = I_3 \quad \text{no mix with V elm.}$$

$s_w^2 = \sin^2 \theta_w \sim 0.23$  ... Weinberg angle = electro-weak mixing angle

	Q	I <sub>3</sub>	g <sub>A</sub>	g <sub>V</sub>	g <sub>V</sub>
V	0	+1/2	+1/2	+1/2	0.50
e	-1	-1/2	-1/2	-1/2 + 2 s <sub>w</sub> <sup>2</sup>	-0.04
U	+2/3	+1/2	+1/2	+1/2 - 4/3 s <sub>w</sub> <sup>2</sup>	0.20
D	-1/3	-1/2	-1/2	-1/2 + 2/3 s <sub>w</sub> <sup>2</sup>	-0.35

	g <sub>V</sub> <sup>2</sup> +g <sub>A</sub> <sup>2</sup>	N <sub>col</sub>	g <sub>V</sub> <sup>2</sup> +g <sub>A</sub> <sup>2</sup>	Γ <sub>i</sub> / Γ
v	1/2	1	0.50	20 %
e	1/4+ε		0.25	10 %
u	0.29	3	1.92	70 %
d	0.35			

$$\Gamma_i \left( \begin{array}{c} f_i \\ -Z^0 \\ - \\ f_i \end{array} \right) \sim g_L^2 + g_R^2 \sim g_V^2 + g_A^2$$