CKM MATRIX DETERMINATION (2)

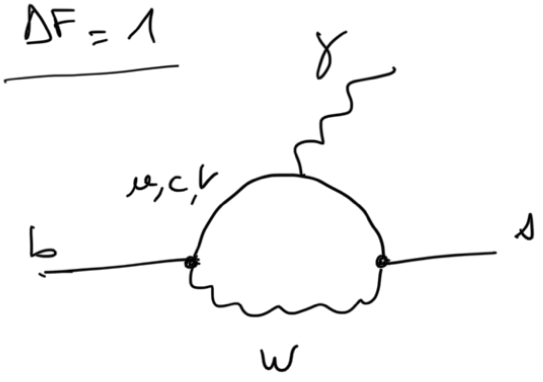
- $|V_{ud}|$ $|V_{us}|$ $|V_{cd}|$ $|V_{cs}|$ $|V_{ub}|$ $|V_{cb}|$ up to now

- V_{tb} : $t \to bW$ useful as a cross-check but not a strong constrain for the CKM matrix determination

- V_{td}, V_{ts} : $t \to sW$ $t \to dW$ not really possible experimentally

→ loop process Flavour Changing Neutral Current Process

- $\Delta F = 1$



$\Delta F = 1$ transition "penguin" diagrams

$V_{us} V_{us}^*$	λ^2
$V_{cb} V_{cs}^*$	λ^2
$V_{tb} V_{ts}^*$	λ^2

Use the unitarity, terms like

$$\frac{m^2_{\text{quark in the loop}}}{m_W^2}$$

arrive (no constant term)

b → sγ transitions dominated by top quark loops { separation of scales $\mathcal{H}_{eff}$ / V_{tb}

$B \to X_s \gamma$ inclusive computation

$B \to K^* \gamma$ exclusive determination

similar arguments (quark hadron duality) as $B \to X_c l \nu$ to compute B_R → μ_π, μ_G ... moments Eγ $\langle B | \bar{b}$ derivatives $| B \rangle$ operators

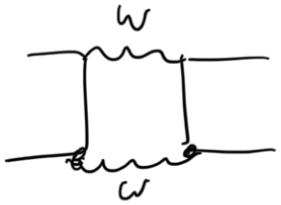
⊕

perturbative part up to a high order

Hadronic contributions are relatively challenging

→ we later discuss the discussion of the b-quark anomalies

- $\Delta F = 2$ B_R diagrams



loop diagram that