

Experimentelle Elementarteilchenphysik

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CKM-Matrix

- CKM-Matrix:

$$V_{\text{CKM}} = \begin{pmatrix} V_{ud} & V_{us} & V_{ub} \\ V_{cd} & V_{cs} & V_{cb} \\ V_{td} & V_{ts} & V_{tb} \end{pmatrix}, \quad V^\dagger V = V V^\dagger = 1$$

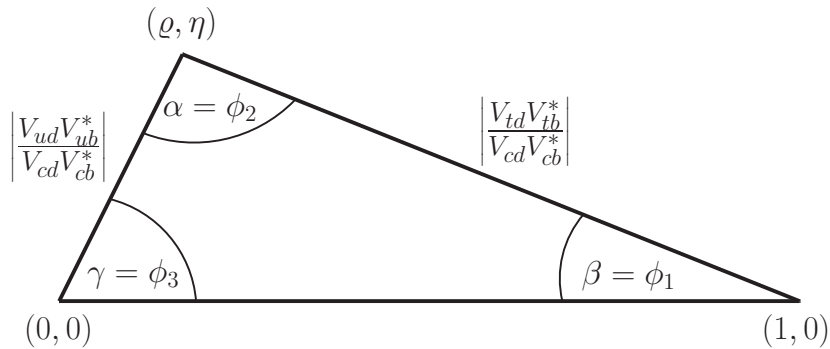
- Wolfenstein-Parametrisierung:

$$V_{\text{CKM}} = \begin{pmatrix} 1 - \lambda^2/2 & \lambda & A\lambda^3(\rho - i\eta) \\ -\lambda & 1 - \lambda^2/2 & A\lambda^2 \\ A\lambda^3(1 - \rho - i\eta) & -A\lambda^2 & 1 \end{pmatrix}$$

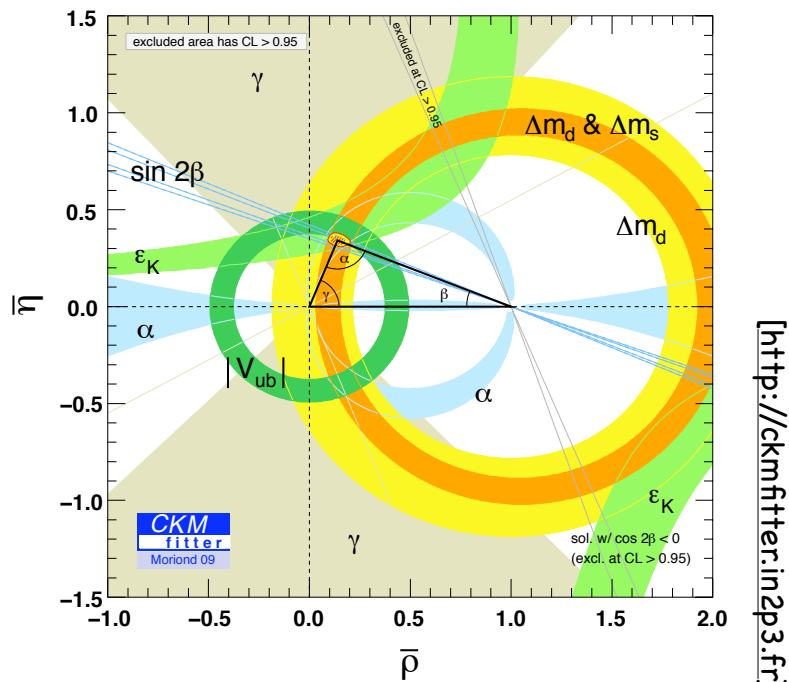
Unitaritätsdreieck

$$V_{ud}V_{ub}^* + V_{cd}V_{cb}^* + V_{td}V_{tb}^* = 0$$

$$\frac{V_{ud}V_{ub}^*}{V_{cd}V_{cb}^*} + \frac{V_{cd}V_{cb}^*}{V_{cd}V_{cb}^*} + \frac{V_{td}V_{tb}^*}{V_{cd}V_{cb}^*} = 0$$

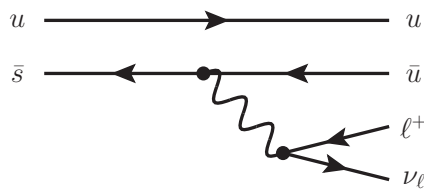


Messung des Unitaritätsdreiecks

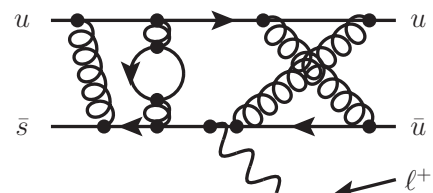


Formfaktoren

● Semileptonischer Kaon-Zerfall

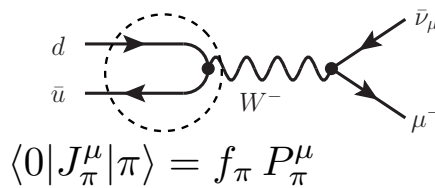


idealisiert



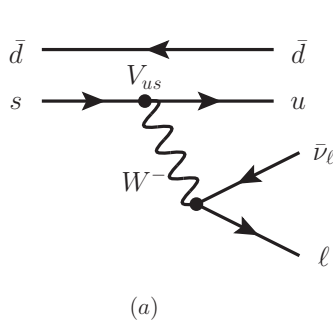
real

● Pion-Zerfall

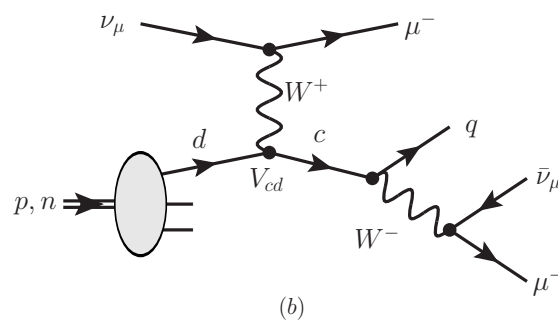


$$\langle 0 | J_\pi^\mu | \pi \rangle = f_\pi P_\pi^\mu$$

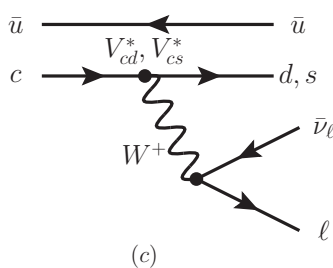
CKM-Matrixelemente



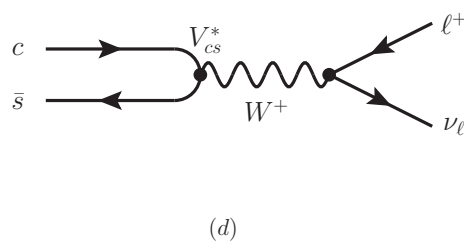
(a)



(b)

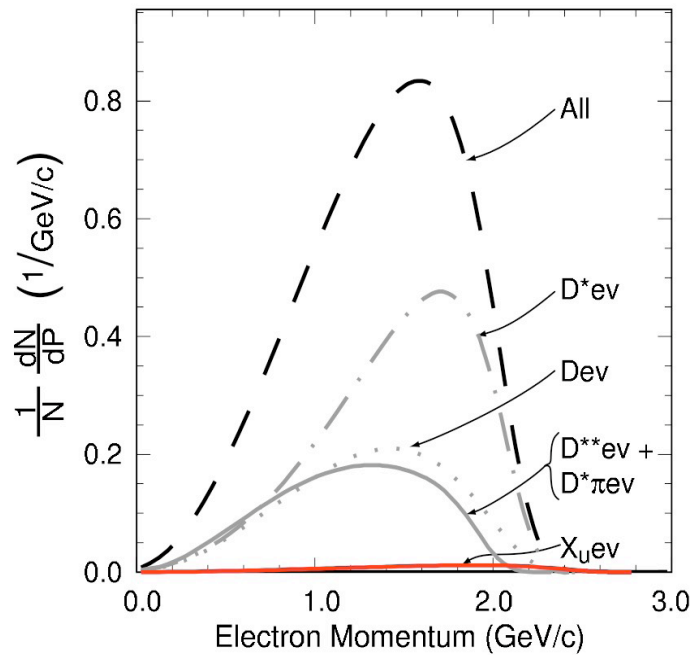


(c)



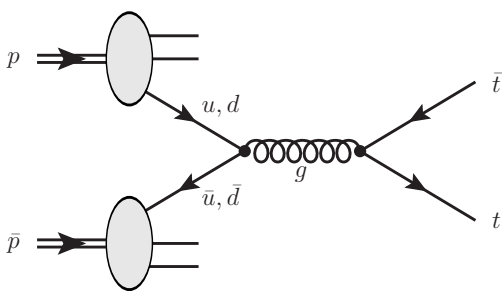
(d)

$|V_{ub}|$ und $|V_{cb}|$

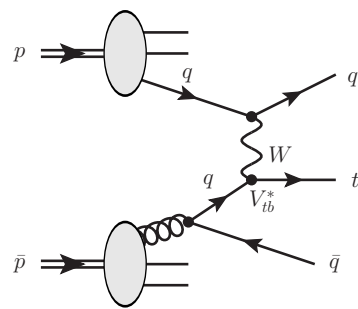


Exp. Elementarteilchenphysik (P23.1.1), HU Berlin, Sommersemester 2009, 8. Vorlesung 7

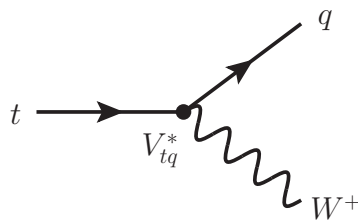
$|V_{td}|$, $|V_{ts}|$, $|V_{tb}|$



Top-Antitop-Produktion in QCD



Elektroschwache Produktion einzelner Top-Quarks



Top-Quark-Zerfall

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V_{tb} goes Hollywood

