Material zur

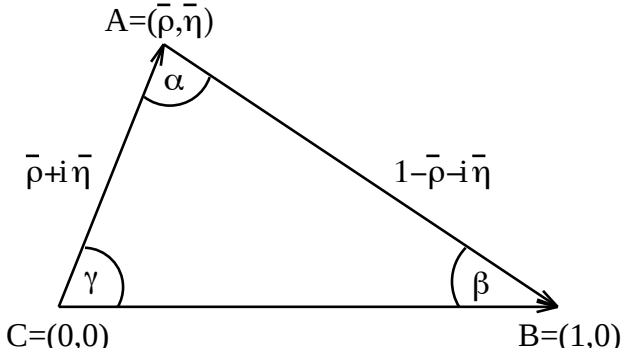
Vorlesung ”Flavorphysik”

Gudrun Hiller, Dortmund

Wolfenstein parameter $\lambda = \sin\Theta_C \simeq 0.22$, $A\lambda^2 \simeq 0.041$

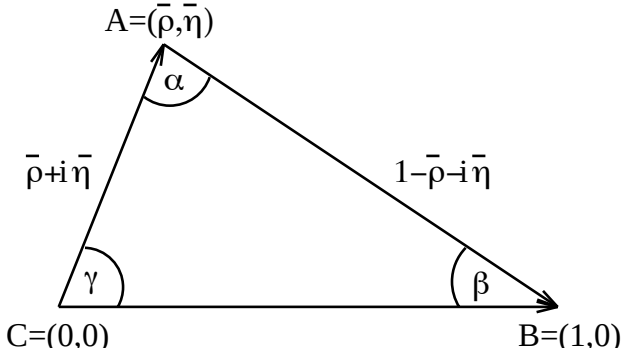
$$V = \begin{pmatrix} V_{ud} & V_{us} & V_{ub} \\ V_{cd} & V_{cs} & V_{cb} \\ V_{td} & V_{ts} & V_{tb} \end{pmatrix} = \begin{pmatrix} 1-\lambda^2/2 & +\lambda & A\lambda^3(\rho - i\eta) \\ -\lambda & 1-\lambda^2/2 & +A\lambda^2 \\ A\lambda^3(1-\rho-i\eta) & -A\lambda^2 & 1 \end{pmatrix} + \mathcal{O}(\lambda^4)$$

the unitarity triangle $V_{ub}V_{ud}^* + V_{cb}V_{cd}^* + V_{tb}V_{td}^* = 0$ $\quad \sum_j V_{ji}V_{jk}^* = \delta_{ik}$



$\bar{\rho} = (1-\lambda^2/2)\rho$, $\bar{\eta} = (1-\lambda^2/2)\eta$ $\qquad$ data: $\alpha, \beta, \gamma = \mathcal{O}(1)$

the unitarity triangle $V_{ub}V_{ud}^* + V_{cb}V_{cd}^* + V_{tb}V_{td}^* = 0$ $\sum_j V_{ji}V_{jk}^* = \delta_{ik}$

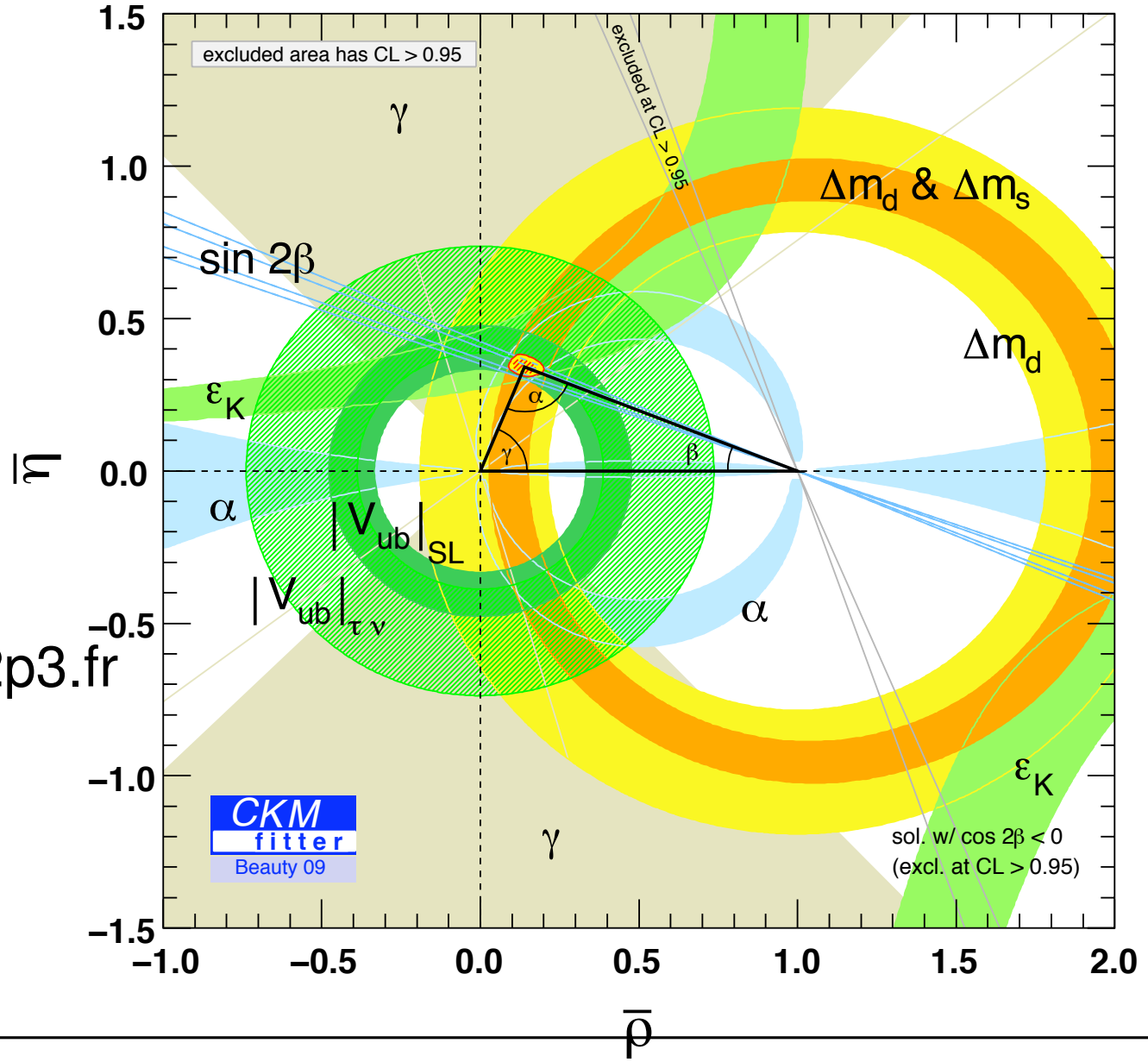


$\bar{\rho} = (1 - \lambda^2/2)\rho$, $\bar{\eta} = (1 - \lambda^2/2)\eta$ data: $\alpha, \beta, \gamma = \mathcal{O}(1)$

$$\beta = \arg(-\frac{V_{cd}V_{cb}^*}{V_{td}V_{tb}^*}) \ , \quad \gamma = \arg(-\frac{V_{ud}V_{ub}^*}{V_{cd}V_{cb}^*}) \ , \quad \alpha = \arg(-\frac{V_{td}V_{tb}^*}{V_{ud}V_{ub}^*}) \ ,$$

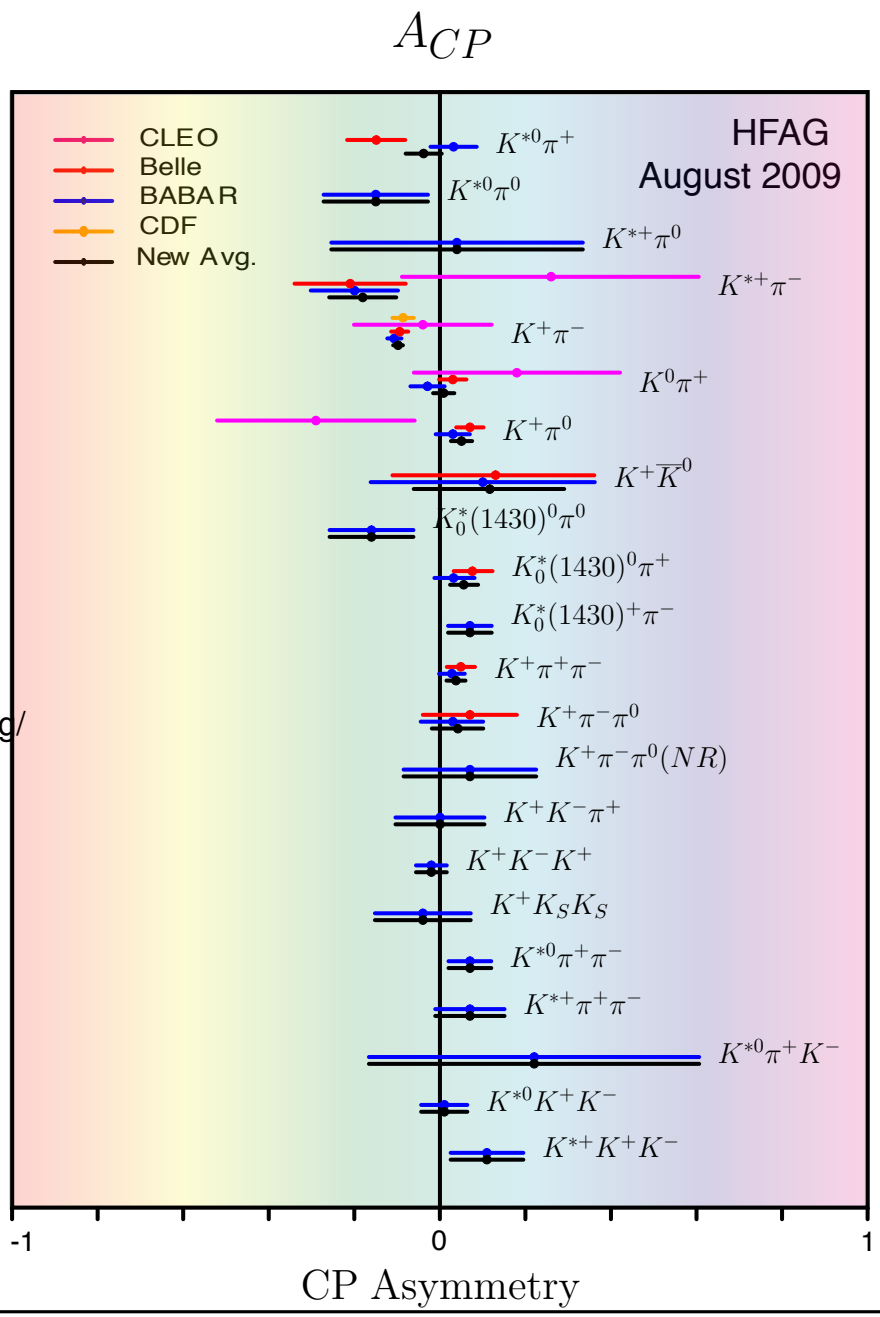
$$\alpha + \beta + \gamma = \pi$$

$$\beta_s = \arg(-\frac{V_{ts}V_{tb}^*}{V_{cs}V_{cb}^*}) \simeq 1^\circ$$



ckmfitter.in2p3.fr

Direkte CP-Asymmetrien

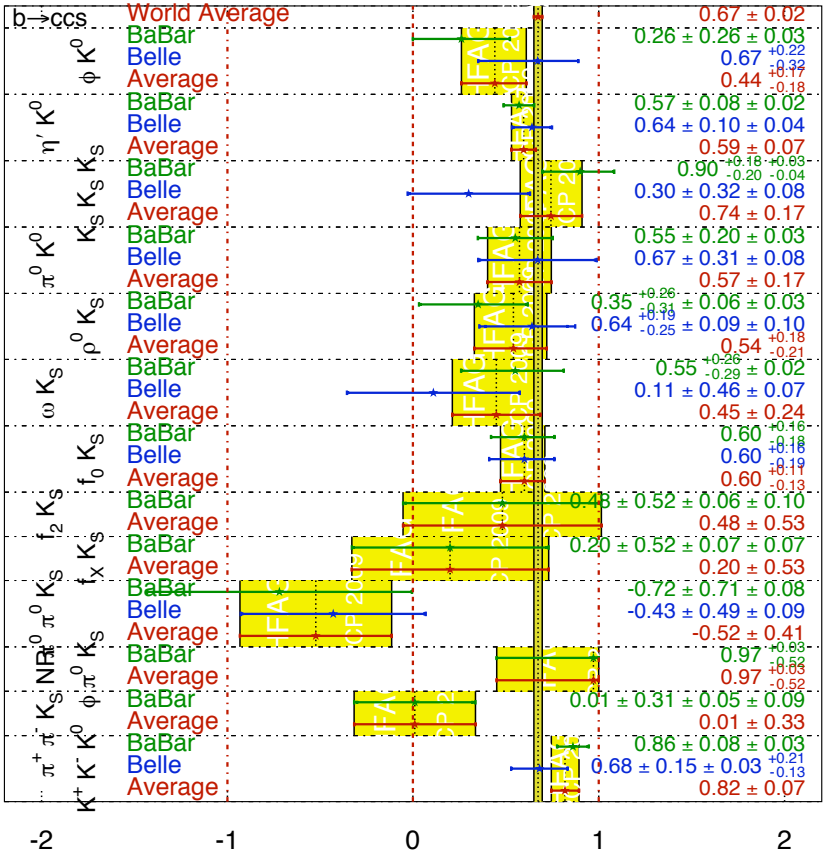


http://www.slac.stanford.edu/xorg/hfag/

CP-Verletzung in Pinguinen jenseits von CKM?

$$\sin(2\beta^{\text{eff}}) \equiv \sin(2\phi_1^{\text{eff}})$$

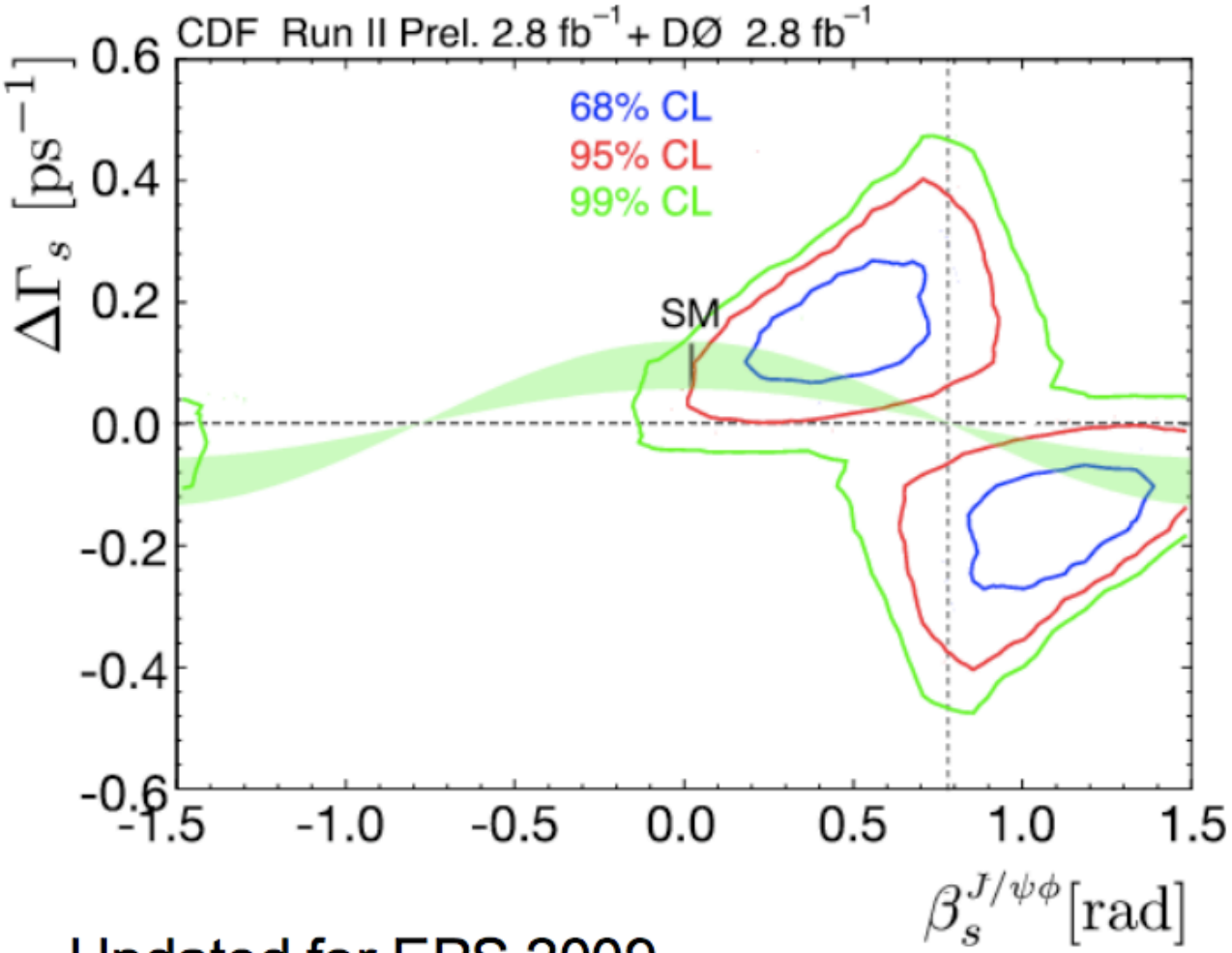
HFAG
FPCP 2009
PRELIMINARY



$$\eta_{\text{CP}} \sin 2\beta(\underbrace{(\bar{s}s)K_S}_{\text{FCNC}}) = \sin 2\beta(\underbrace{(\bar{c}c)K_S}_{tree}) + |\underbrace{\frac{V_{ub}V_{us}^*}{V_{tb}V_{ts}^*}}_{0.02}| \cdot \#(hadronic)$$

$$S_f = -\eta_{CP} \sin 2\beta^{\text{eff}}$$

Combination of CDF & D0 results



Combined likelihood finds 2.1σ deviation from SM

Combination including other measurements of $\Delta\Gamma$, e.g. a_{sl}, will be shown in Iain Bertram's talk

Updated for EPS 2009

http://www-d0.fnal.gov/Run2Physics/WWW/results/prelim/B/B59/B59.pdf

http://www-cdf.fnal.gov/physics/new/bottom/090721.blessed-betas_combination2.8/