NP UTfit results with new DiMuon Asymmetry

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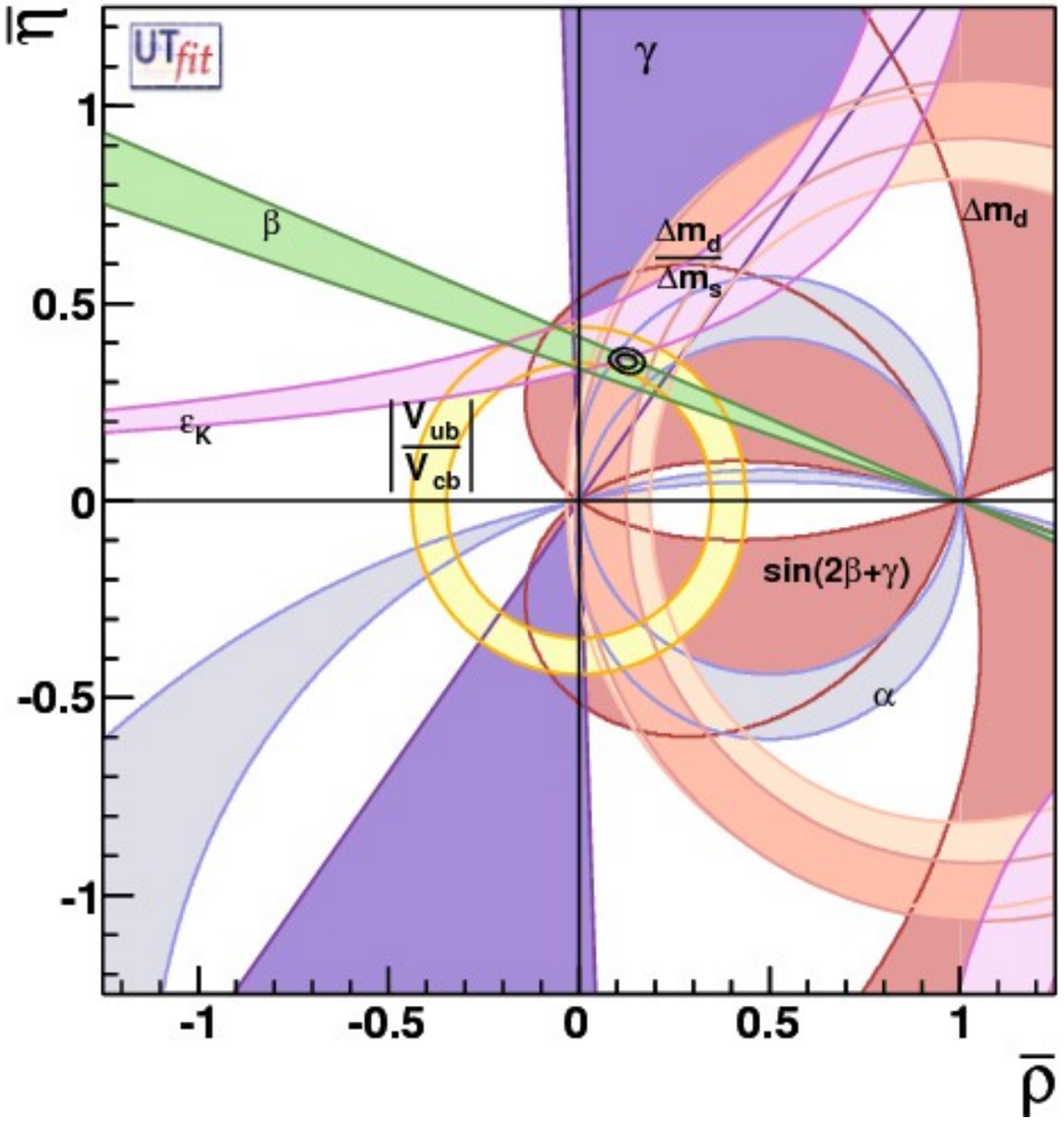
on behalf of the UTfit Collaboration

Here and in the following: PRELIMINARY summer 2010 results

SM fit and Bd sector



$\bar{\rho} = 0.126 \pm 0.020$

$\bar{\eta} = 0.355 \pm 0.013$

$\beta = (22 \pm 1)°$

$\gamma = (70 \pm 3)°$

$\alpha = (87 \pm 3)°$

As usual: overall agreement within errors

Since a while: tension between Vub and sin2β

More recently: ε_K larger than what expected by the fit Guadagnoli&Buras, recent lattice inputs)

Comment on Uncertainties

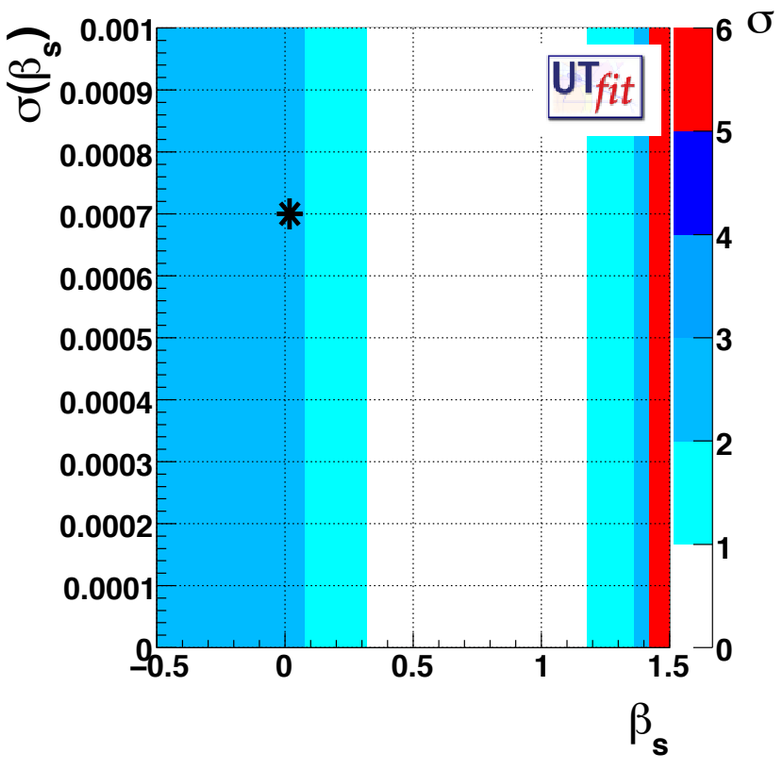
- In sin2β from $J/\Psi K_s$ th. error from decay amplitude fully under control (conservative estimate from data)
- ε_K affected by uncertainties in $\Delta S=1$ & long-distance contributions; several 2-3% effects, difficult to estimate; re-evaluation of theory error mandatory

Luca Silvestrini
Talk at SuperB Elba meeting

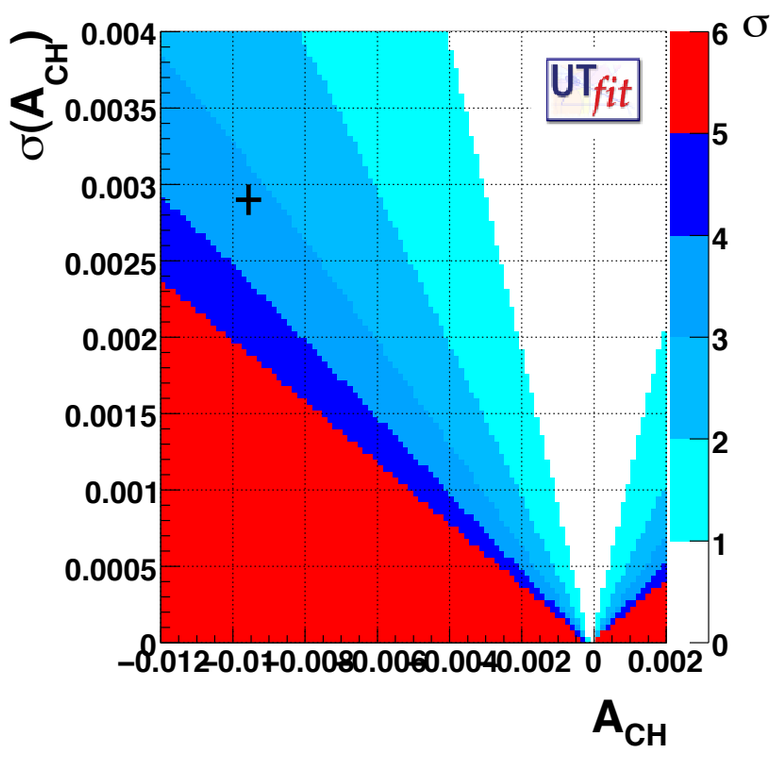
No reason to call for NP in Bd sector

The Bs sector

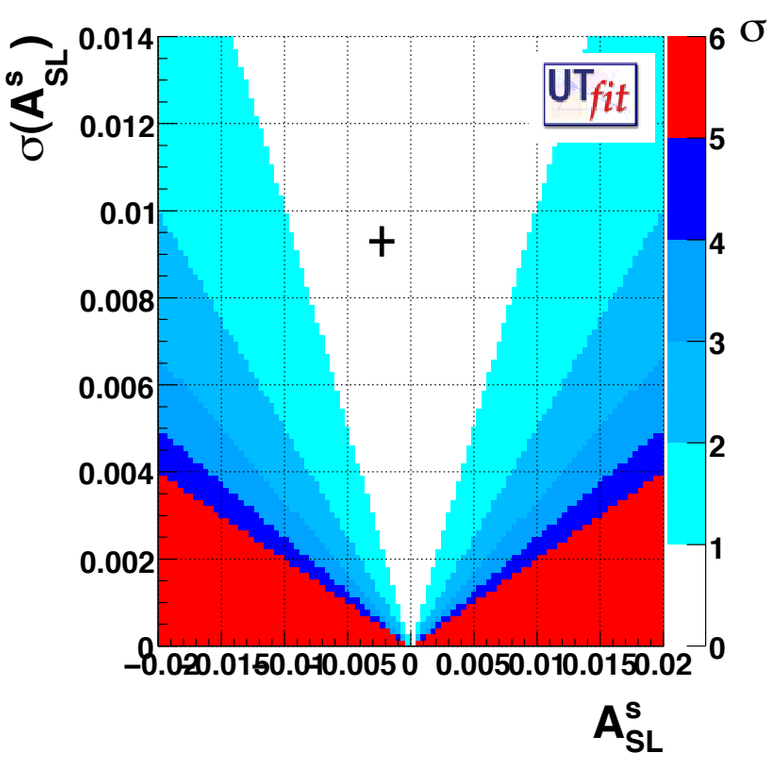
Situation more confusing (and interesting)
Two measurements show some deviation from SM
Other measurements are OK, but with very large errors



Time-dep
J/ψ ϕ



Dimuon
asymmetry



Semileptonic
asymmetry

Comment on Bs Uncertainties

- In $\sin 2\beta_s$ from $J/\Psi\phi$ th. error from decay amplitude not under control, but comparable to SM prediction
- $\Delta\Gamma/\Gamma$ and semileptonic asymmetries under control unless OPE badly fails. Can be improved (B-parameters & subleading corrections)

Luca Silvestrini
Talk at SuperB Elba meeting

New Physics fit

K mixing amplitude (2 real parameters):

$$\mathrm{Re}\,A_K = C_{\Delta m_K}\,\mathrm{Re}\,A_K^{SM} \qquad \mathrm{Im}\,A_K = C_\varepsilon\,\mathrm{Im}\,A_K^{SM}$$

Not in this talk

B_d and B_s mixing amplitudes (2+2 real parameters):

$$A_q = C_{B_q} e^{2i\phi_{B_q}} A_q^{SM} e^{2i\phi_q^{SM}} = \left(1 + \frac{A_q^{NP}}{A_q^{SM}} e^{2i(\phi_q^{NP} - \phi_q^{SM})}\right) A_q^{SM} e^{2i\phi_q^{SM}}$$

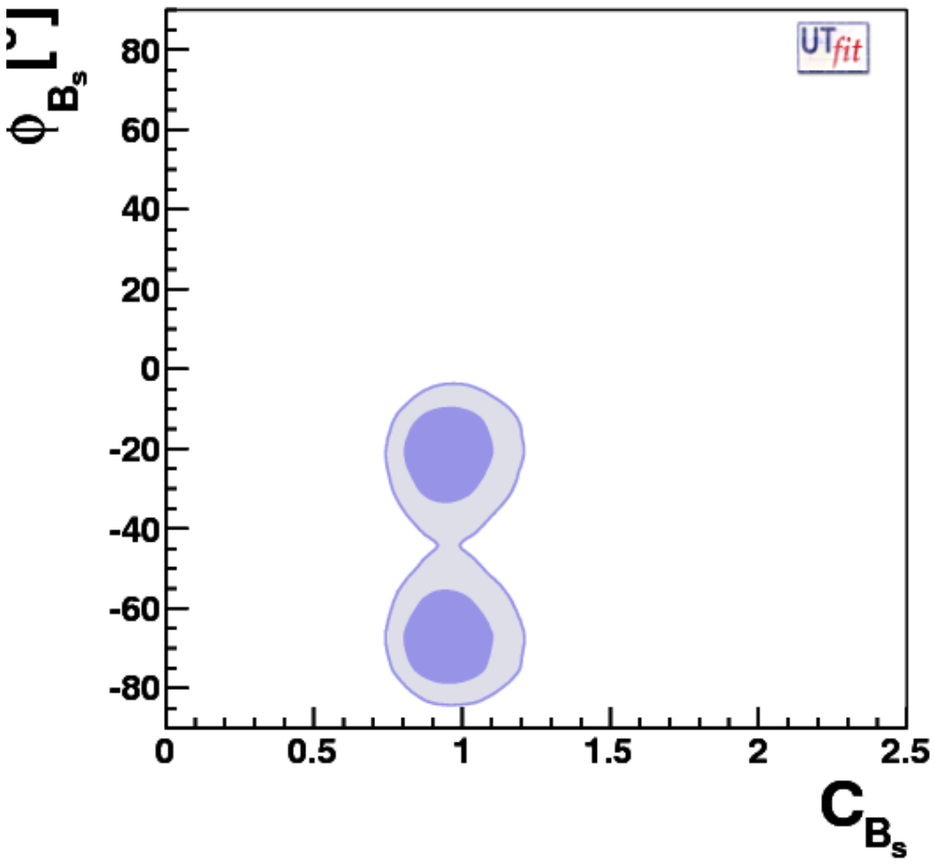
Observables:

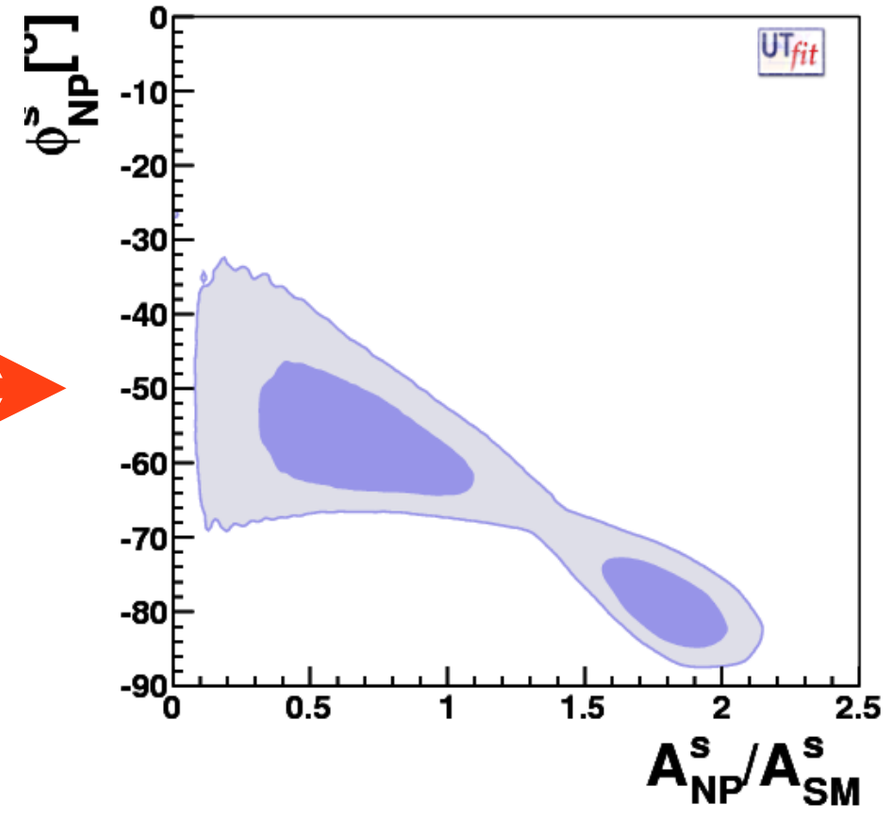
$$\Delta m_{q/K} = C_{B_q/\Delta m_K} (\Delta m_{q/K})^{SM}$$

$$A_{CP}^{B_d \to J/\psi K_S} = \sin 2(\beta + \phi_{B_d}) \qquad A_{CP}^{B_s \to J/\psi \phi} \sim \sin 2(-\beta_s + \phi_{B_s})$$

$$A_{SL}^q = \mathrm{Im}\left(\Gamma_{12}^q / A_q\right) \qquad \Delta\Gamma^q / \Delta m_q = \mathrm{Re}\left(\Gamma_{12}^q / A_q\right)$$

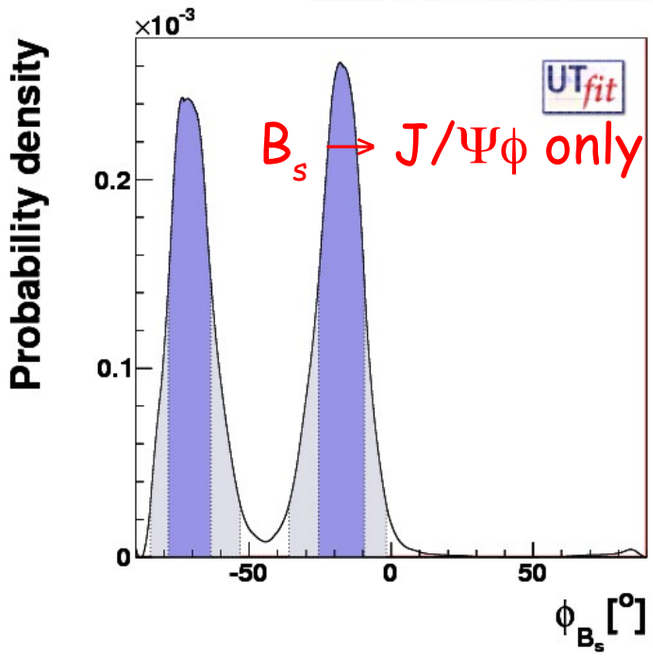
Assumes NP only in loops





$C_{Bs} = 0.95 \pm 0.10\ [0.78, 1.16]$

$\phi_{Bs} = (-21 \pm 8)^\circ \cup (-68 \pm 8)^\circ\ [-38, -7]^\circ \cup [-82, -51]^\circ$



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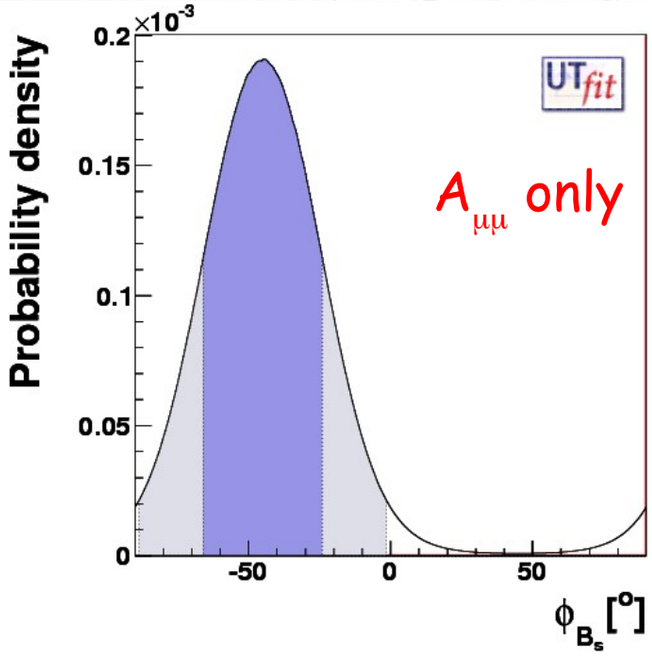

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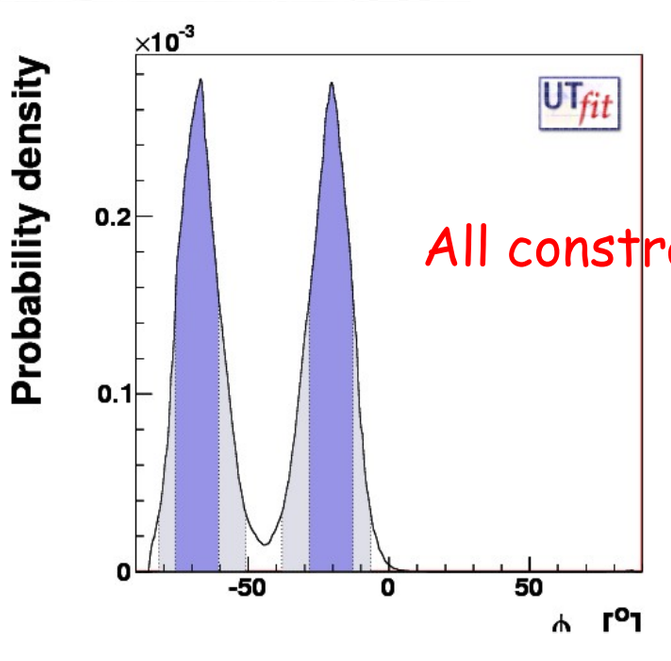
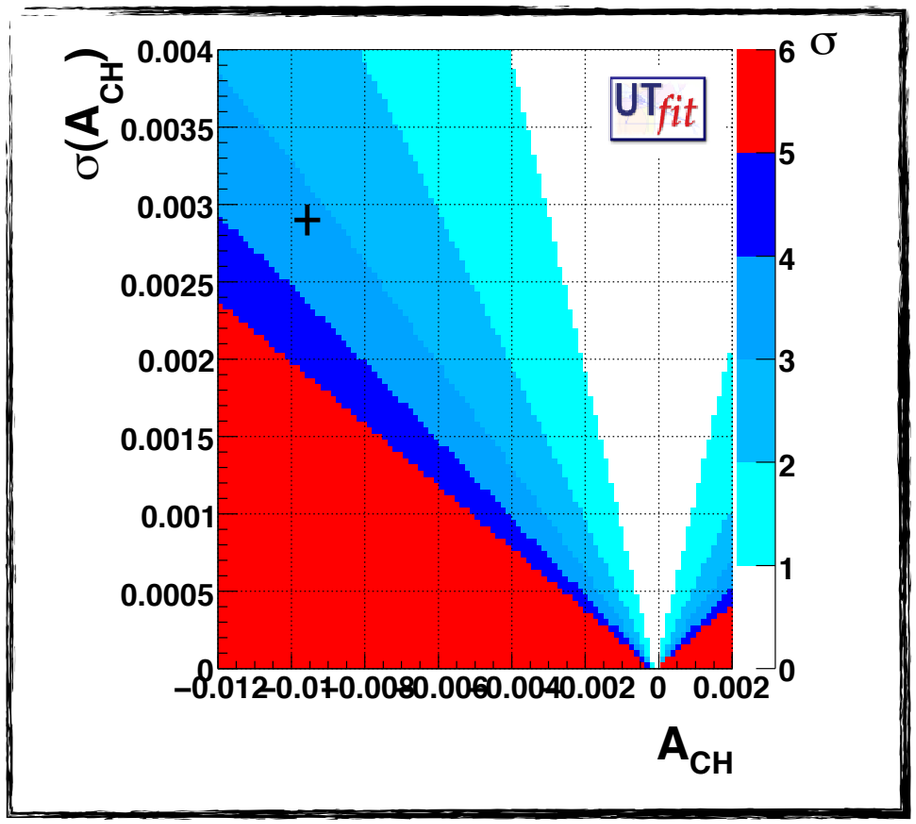
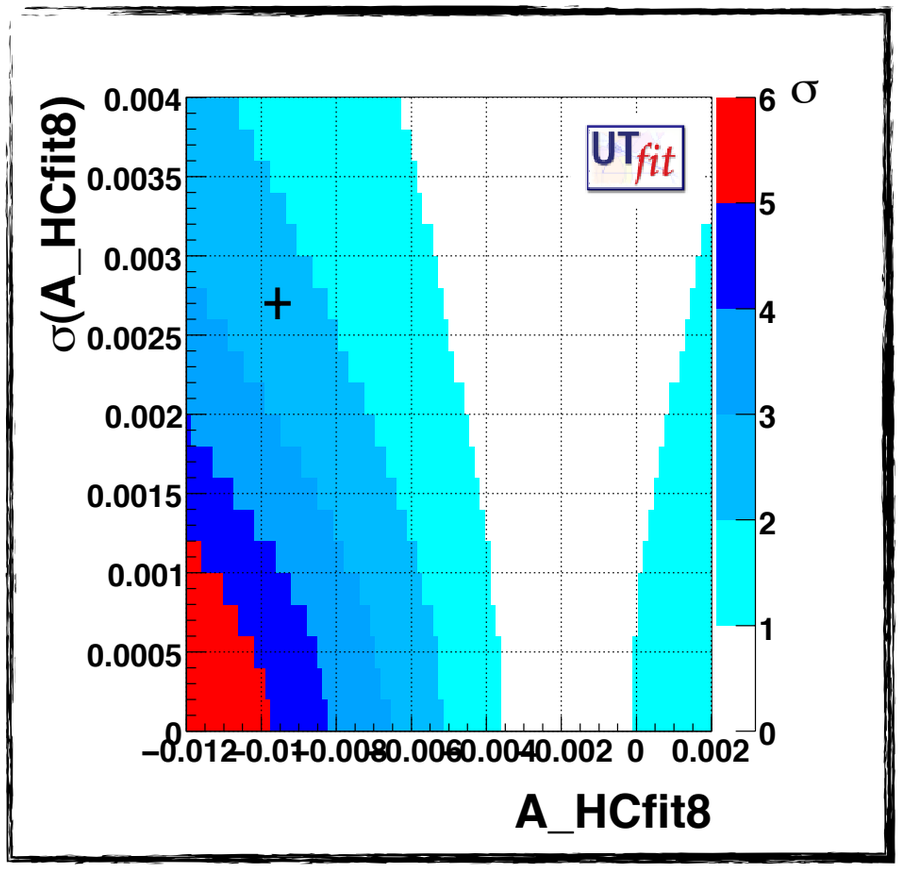


But...

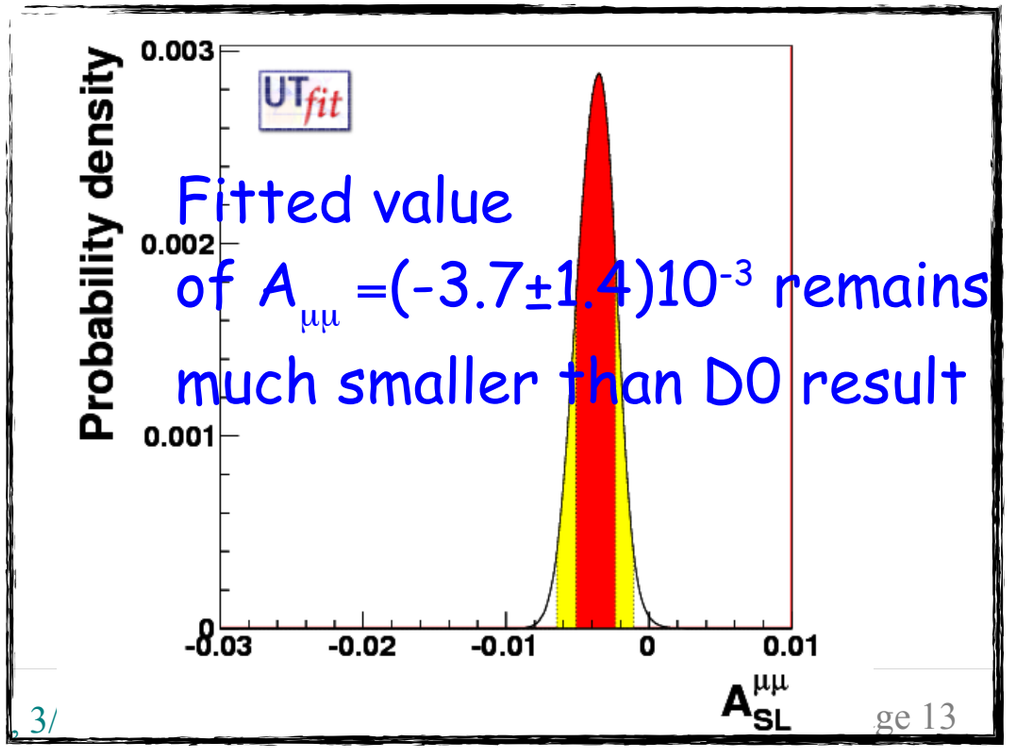
$A_{\mu\mu}$ Still problematic



problem still there



- NP improves the fit agreement only marginally
- Indeed, one cannot reproduce the dimuon asymmetry within our hypotheses (no NP at tree level)
- A factor-three enhancement in $\Delta\Gamma$ is needed



Open possibilities

- Experimental issue (statistic? systematic?)
- Our assumption does not hold: NP at tree level affects $\Delta\Gamma$
- The calculation of $\Delta\Gamma$ in the Standard Model is off by a factor three
- This is a NP effect, but not related to B physics (analysis does not tag the initial state)