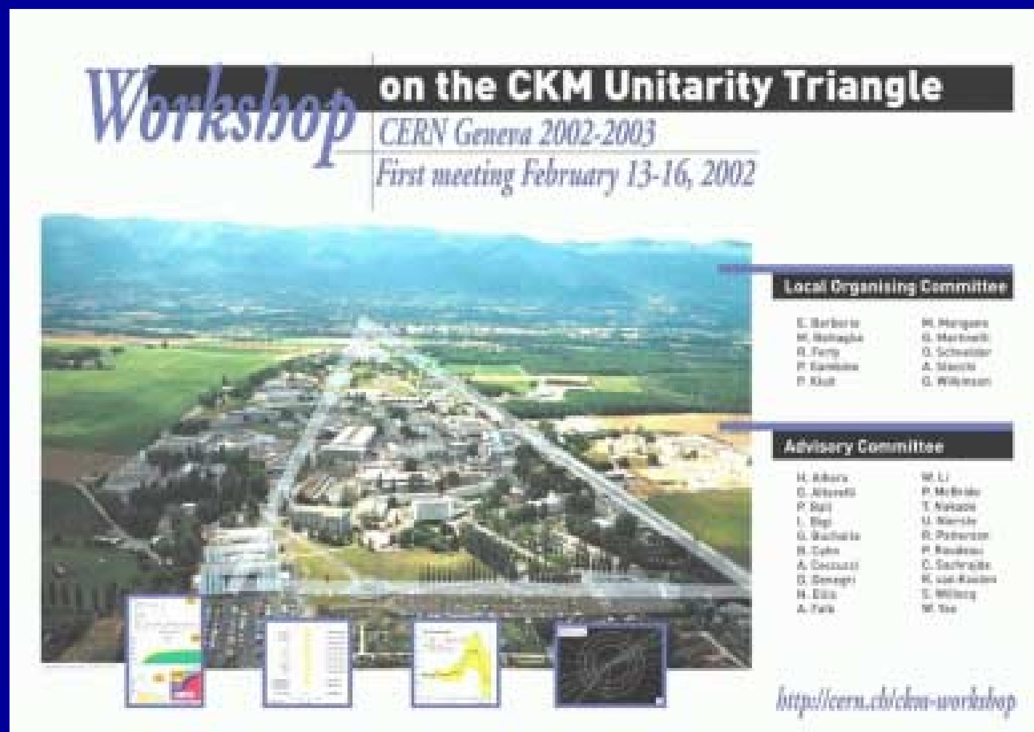
Highlights from the Workshop on the CKM Unitarity Triangle

Marco Battaglia
CERN - Geneva



CKM Unitarity Triangle Workshop meant to provide an opportunity for intense exchange of ideas between experimentalists and theorists:

- to assess present knowledge on fundamental parameters from LEP and other colliders data of LEP, to define an agenda of future measurements
- to further probe model assumptions employed in interpretation of the data
- to indicate paths for B physics programme at LHC.

First meeting held at CERN from 13th to 16th of February focused on status of the extraction of the triangle sides.

- to review the status of the determination of the relevant CKM elements, both in terms of their overall accuracy and of the theoretical uncertainties in their extraction from experimental observables;
- to define a programme for future studies to test the underlying theoretical assumptions adopted in the derivation of the results from the Z and $\Upsilon(4S)$ data
- to provide a critical review of the impact of LEP + SLD + Tevatron Run I data on SM tests through the Unitarity Triangle;
- to define a forum to organise an orderly hand-over of the responsibility for heavy flavour physics world averages.

220 registered participants,
79 talks in plenary opening and closing, working group plenary and parallel time and 12 discussion sessions

Working Group I
($|V_{cb}|$, $|V_{ub}|$, lifetimes and lifetime differences)

conveners: *E. Barberio, L. Lellouch, K. Schubert*

Charge:

The Working Group I will address the issues related to the determination of $|V_{ub}|$ and $|V_{cb}|$, lifetimes and lifetime differences critically reviewing the present experimental results, their theoretical foundations. Future perspectives should also be summarized and further measurements, that may further validate the assumptions used in present analyses, discussed. This Working Group is expected to provide inputs to Working Group III for the unitarity triangle fits and to discuss the statistical meaning of the quoted uncertainties (or range of values).

Working Group II
($|V_{td}|$, $|V_{ts}|$)

conveners: *J. Flynn, M. Paulini, S. Willocq*

Charge:

The Working Group II will address the issues related to the determination of $|V_{td}|$, $|V_{ts}|$, through the study of neutral B meson oscillations and B decays. The Working Group II is expected to provide inputs to Working Group III for the unitarity triangle fits and to discuss the statistical meaning of the quoted uncertainties (or range of values).

Working Group III
(CKM Fits)

conveners: *A. Buras, F. Parodi*

Charge:

This Group should assess the status of the Unitarity Triangle tests as obtained from fits with the inputs received from the other Working Groups. This includes obtaining the best fit from sides measurements, extracting individual parameters and testing the compatibility of data by a global fit. Different interpretations of the results should be tested both in the Standard Model and beyond. Optimal ways to combine the results both for unitarity tests and for acquiring sensitivity to new physics should also be investigated.

A Value for m_b

A Compilation of b quark Mass Values (A.Hoang)

author	$\overline{m}_b(\overline{m}_b)$	other mass	comments
Voloshin 95		$m_{\rm pole} = 4.83 \pm 0.01$	NLO Υ sum rules, no th.uncert.
Kuhn 98		$m_{\rm pole} = 4.78 \pm 0.04$	NLO Υ sum rules
Penin 98		$m_{\rm pole} = 4.78 \pm 0.04$	NNLO Υ sum rules
Hoang 98		$m_{\rm pole} = 4.88 \pm 0.13$	NLO Υ sum rules
Hoang 98	4.26 ± 0.09 *	$m_{\rm pole} = 4.88 \pm 0.09$	NNLO Υ sum rules
Melnikov 98	4.20 ± 0.10	$M_{\rm kin}^{1\,{\rm GeV}} = 4.56 \pm 0.06$	NNLO Υ sum rules
Penin 98	4.21 ± 0.11 *	$m_{\rm pole} = 4.80 \pm 0.06$	NNLO Υ sum rules
Jamin 98	4.19 ± 0.06		Υ sum rules; no exact info
Hoang 99	4.20 ± 0.06	$M_{1S} = 4.71 \pm 0.03$	NNLO Υ sum rules
Beneke 99	4.26 ± 0.09	$M_{\rm PS}^{2\,{\rm GeV}} = 4.60 \pm 0.11$	NNLO Υ sum rules
Hoang 00	4.17 ± 0.05	$M_{1S} = 4.69 \pm 0.03$	NNLO Υ sum rules, m_c eff.
Kuhn 01	4.21 ± 0.05		low-n Υ sum rules, $\mathcal{O}(\alpha_s^2)$
Pineda 97		$m_{\rm pole} = 5.00^{+0.10}_{-0.07}$	$M(\Upsilon(1S))_{\rm NNLO}$ & non-pert. eff.
Beneke 99	4.24 ± 0.09	$M_{\rm PS}^{2\,{\rm GeV}} = 4.58 \pm 0.08$	$M(\Upsilon(1S))_{\rm NNLO}$ & non-pert. eff.
Hoang 99	4.21 ± 0.07	$M_{1S} = 4.73 \pm 0.05$	$M(\Upsilon(1S))_{\rm NNLO}$ & non-pert. eff.
Pineda 01	4.21 ± 0.09	$M_{\rm 3S}^{2\,{\rm GeV}} = 4.39 \pm 0.11$	$M(\Upsilon(1S))_{\rm NNLO}$ & non-pert. eff.
Brambilla 01	4.19 ± 0.03		$M(\Upsilon(1S))_{\rm NNLO}$ & pert.th. only

$$\bar{m}_b(\bar{m}_b) = (4.21 \pm 0.08)\,{\rm GeV} \quad \rightarrow \quad m_b^{kin}(1\ {\rm GeV}) = (4.58 \pm 0.09)\,{\rm GeV}$$

$|V_{cb}|$ from Inclusive $b \to X_c \ell \bar{\nu}$

(P. Roudeau, T. Brandt, Z. Ligeti, M. Artuso)

✧ V_{cb} from Γ_{sl} using HQE expression and uncertainty estimate $(\times 2)$:

Bigi, Shifman and Uraltsev, Ann. Rev. Nucl. Part. Sci. 47 (1997)

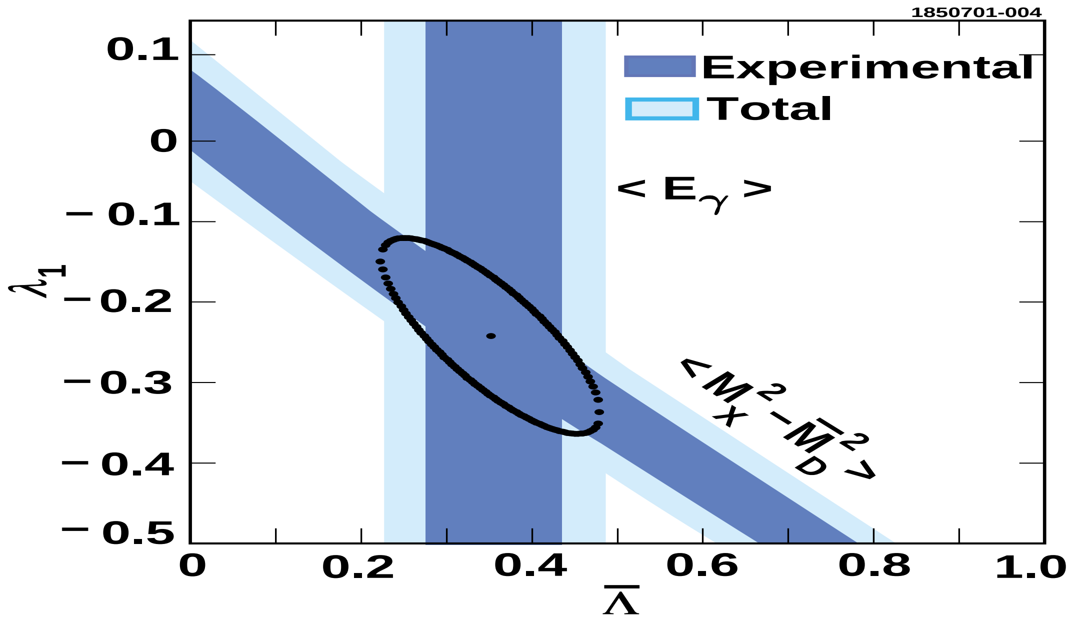
$$|V_{cb}| = 0.0411 \quad \times \left(\frac{\mathrm{BR}(b \to X_c \ell \nu)}{0.105} \frac{1.55\mathrm{ps}}{\tau_b}\right)^{\frac{1}{2}}$$
$$\times \left(1 \pm 0.024 \frac{\mu_\pi^2 - 0.5\ \mathrm{GeV}^2}{0.1\ \mathrm{GeV}^2}\right)$$
$$\times \left(1 \pm 0.030(\mathrm{pert.}) \pm 0.020(\mathrm{m_b}) \pm 0.024(1/\mathrm{m_Q^3})\right)$$

✧ V_{cb} using result of CLEO fit to first moment in E_γ $(B \to X_s \gamma)$ and M_X $(B \to X_c \ell \bar{\nu})$ (CLEO Coll., hep-ex0108033):

$$|V_{cb}| = 0.0400 \quad \times \left(\frac{\mathrm{BR}(b \to X_c \ell \nu)}{0.105} \frac{1.55\mathrm{ps}}{\tau_b}\right)^{\frac{1}{2}}$$
$$\times \left(1 \pm 0.012(\bar{\Lambda},\ \lambda_1)_{exp} \pm 0.020(\alpha_\mathrm{s},\ 1/\mathrm{m_Q^3})_{th}\right)$$

❖ m_b and λ_1 uncertainties now absorbed in *experimental* systematics;

❖ remaining theory systematics due to $1/m^3$ corrections, α_s... : (will need to overconstrain with additional moments measurements to improve our understanding of these effects: E_ℓ)



$$\Gamma_{sl}(LEP) = 0.0676 \pm 0.0016(\mathrm{exp}) \pm 0.0009(\mathrm{model})\ \mathrm{ps}^{-1}$$

$$\Gamma_{sl}(\Upsilon(4S)) = 0.0670 \pm 0.0020(\mathrm{exp}) \pm 0.0003(\mathrm{model})\ \mathrm{ps}^{-1}$$

$$\Gamma_{sl}(average) = 0.0673 \pm 0.0013(\mathrm{tot})\ \mathrm{ps}^{-1}$$

$$|V_{cb}|_{incl} = 0.0417 \pm 0.0004(\mathrm{BR}, \tau) \pm 0.0005(\lambda_1,\ \bar{\Lambda}) \times 0.0083(\mathrm{th})$$

✧ still relies on quark-hadron duality assumption which needs to be tested.

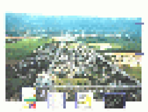
What spectra can be useful?

- E_ℓ in $B \to X_c \ell \bar\nu$: Voloshin ('94), aim at $m_b - m_c$
  Gremm, Z.L., Kapustin, Wise ('96), cut on E_ℓ, to use only data
  Gremm & Stewart: to order $\alpha_s^2 \beta_0$
- m_X in $B \to X_c \ell \bar\nu$: Falk, Luke, Savage ('95)
- E_γ in $B \to X_s \gamma$: Kapustin & Z.L. ('95), $\langle E_\gamma \rangle_{E_0} = \frac{m_B - \bar\Lambda}{2}\left[1 + \mathcal{O}\left(0\frac{\Lambda^2}{m_b^2}, \alpha_s, \ldots\right)\right]$
  Z.L., Luke, Manohar, Wise ('99): to order $\alpha_s^2 \beta_0$

Last two cases: only moments are calculable model independently, not spectra

Most of these papers used the pole mass, $\bar\Lambda$ and λ_1 (more on this later)

- Other spectra one might consider:
  Dilepton (q^2): there was data on m_X (D^{**}), this seemed harder & not more useful
  Hadron energy (E_X): unlikely to be better / easier than any of the above



Zoltan Ligeti – p.2

Exclusive $|V_{cb}|$ Determinations

(A. Kronfeld, K. Ecklund)

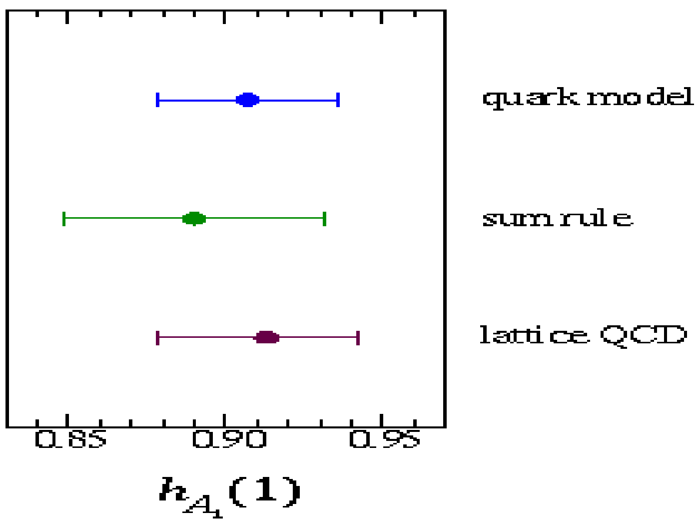
Determination from Exclusive $B \to D^* \ell \nu$ Decays

✧ Measure differential decay rate:

$$\frac{d\Gamma}{dw} = \frac{G_F^2}{48\pi^3}|V_{cb}|^2 \times \mathcal{F}(w) \times \mathcal{G}(w)$$

✧ Heavy quark symmetry provides normalisation $\mathcal{F}(1) = 1$ in the limit $m_Q \to \infty$;

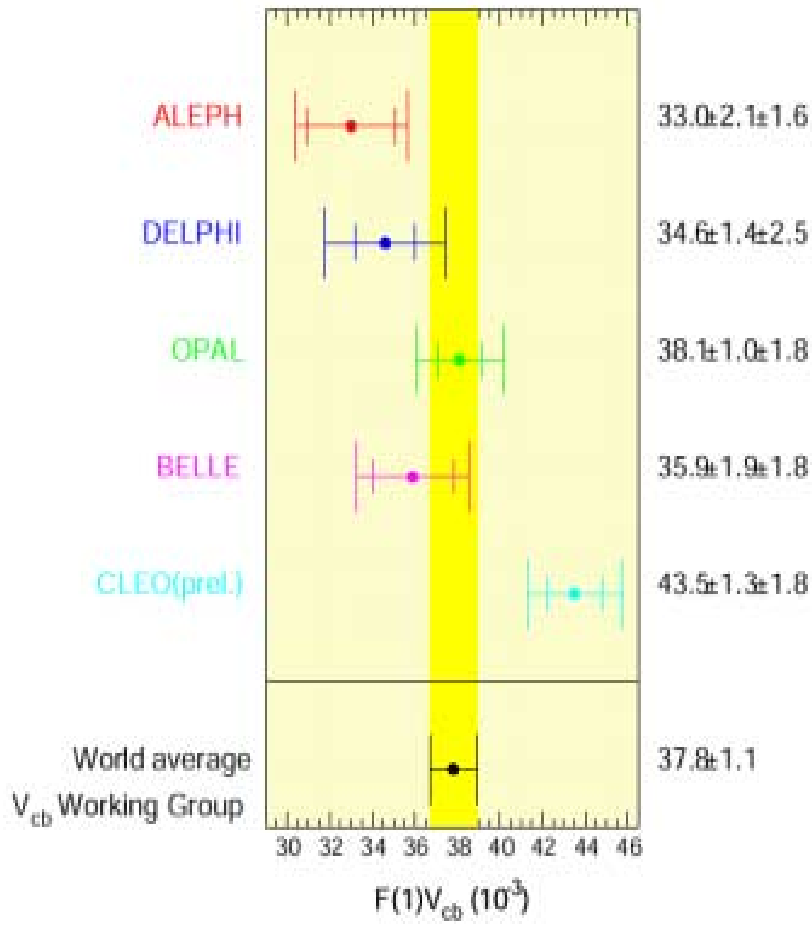
✧ Need to extrapolate measurement to $w = 1$ and compute correction to $\mathcal{F}(1)$ normalisation (quark model, sum rules and Lattice QCD).

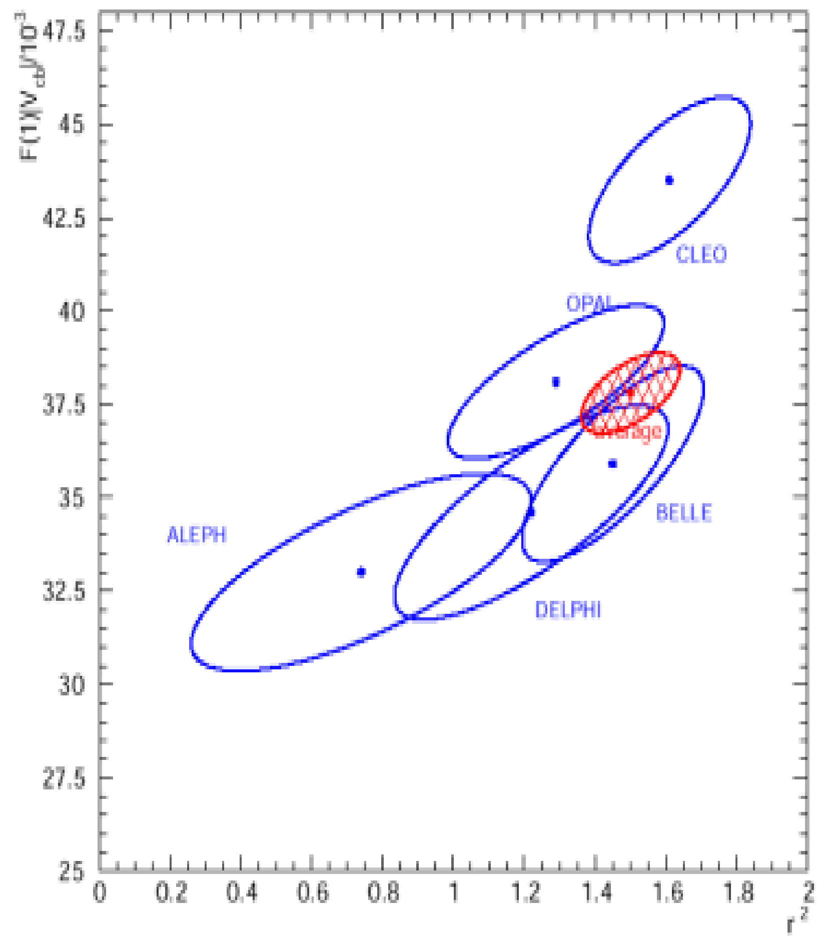


(A. Kronfeld)

Agreement on $\mathcal{F}(1) = 0.91 \pm 0.04$ (Gaussian)

(K. Ecklund and E. Barberio)





$$|V_{cb}|_{excl} = 0.0415 \pm 0.0010 \text{ (comb. exp.)} \pm 0.0017 \text{ (th.)}$$

Inclusive $b \to X_u \ell \bar{\nu}$ at LEP

ALEPH

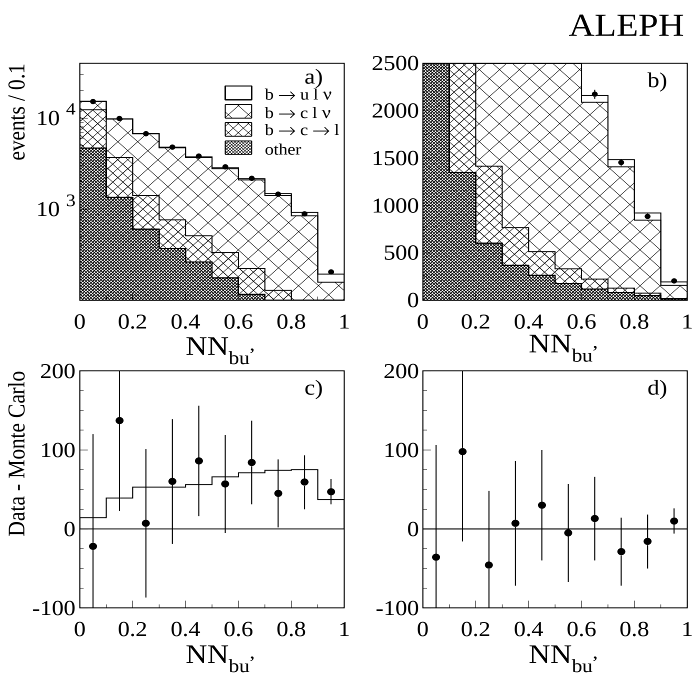
EPJ C6 (1999)

Inclusive NN Selection

Fit NN Output

check with M_B and Vtx.

Eff = 11%, S/B = 0.07



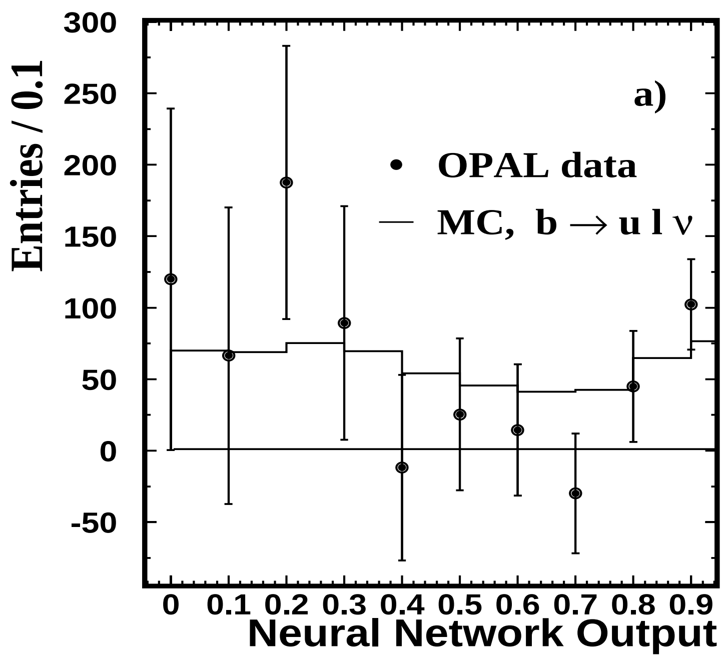
OPAL

EPJ C21 (2001)

Inclusive NN Selection

Fit NN Output

Eff = 4.2, S/B = 0.05



Inclusive $b \to X_u \ell \bar{\nu}$ at LEP

DELPHI

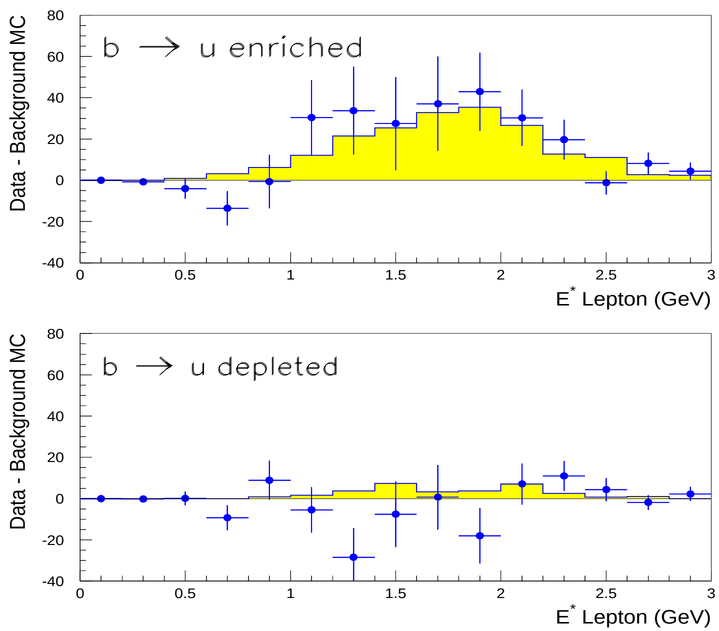
PLB B478 (2000)

M_X Selection

Fit E^*_ℓ for $M \gtrless 1.6$

for enriched and depleted samples

Eff = 6.5%, S/B = 0.10



L3

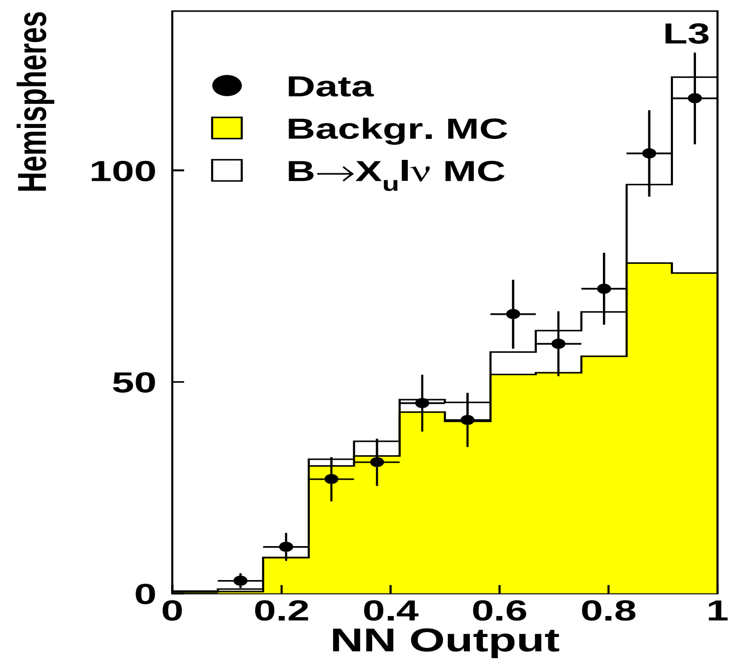
PLB B436 (1998)

$\pi\ell$ Kinematic Selection

Counting Expt

check with NN

Eff = 1.5%, S/B = 0.16

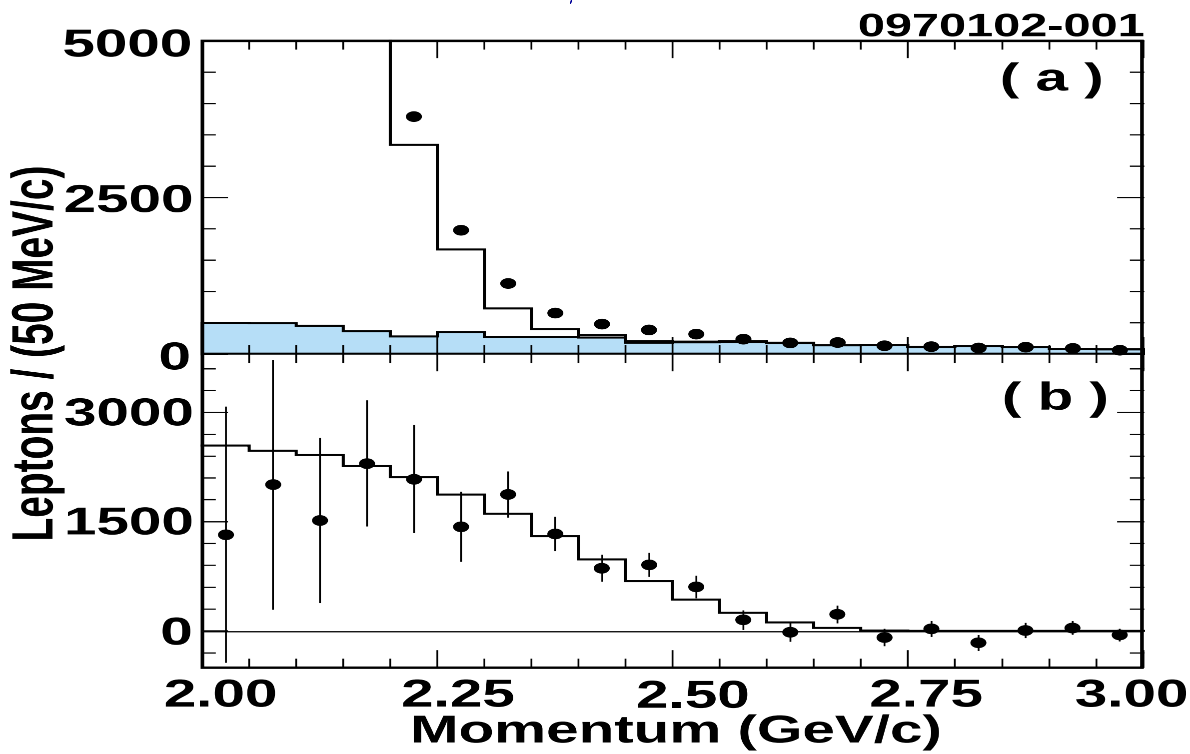


E_ℓ End-Point at CLEO

A. Bornheim *et al.*, hep-ex/0202019

✧ Signal acceptance in 2.2< E_ℓ <2.6 GeV end-point $\simeq 13\%$

✧ Encode non-perturbative QCD effects in E_ℓ spectrum in $B \to X_u \ell \bar{\nu}$ by *universal* shape function fitted on E_γ spectrum in $B \to X_s \gamma$:

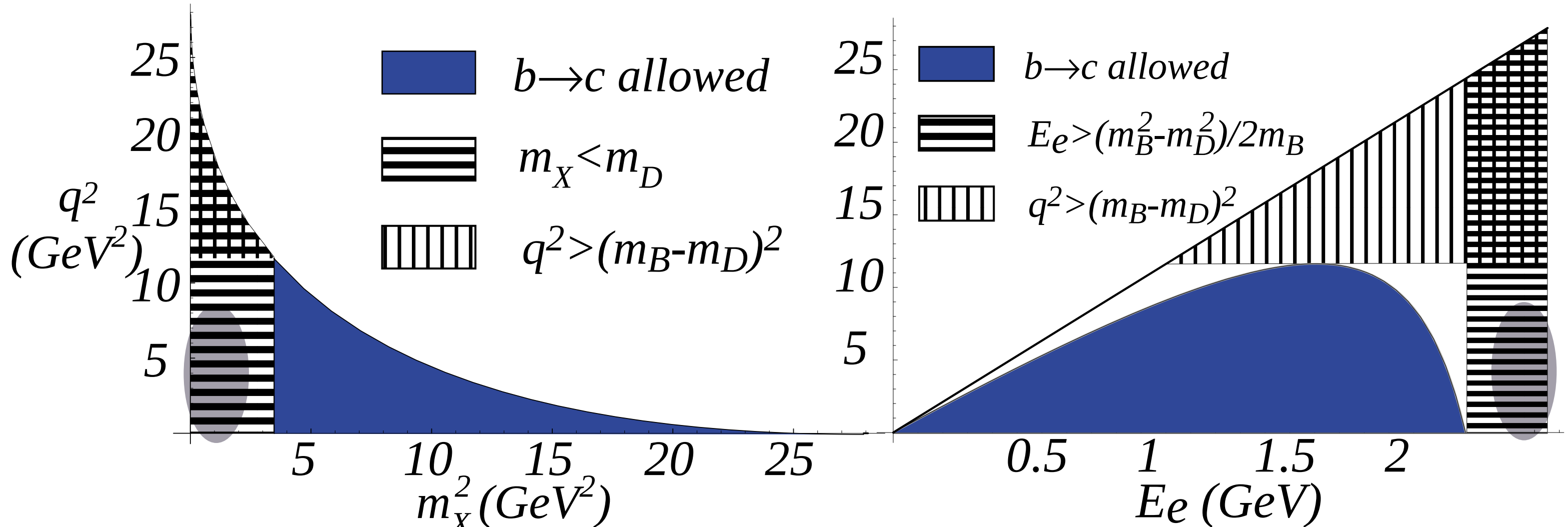


$$\mathrm{BR}(\mathrm{b} \to \mathrm{X_u} \ell \nu) = (1.77 \pm 0.29\ (\mathrm{stat.} + \mathrm{exp.}) \pm 0.38\ (\mathrm{extrapolation})) \times 10^{-3}$$

Is Inclusive Inclusive Enough ?

(C. Bauer)

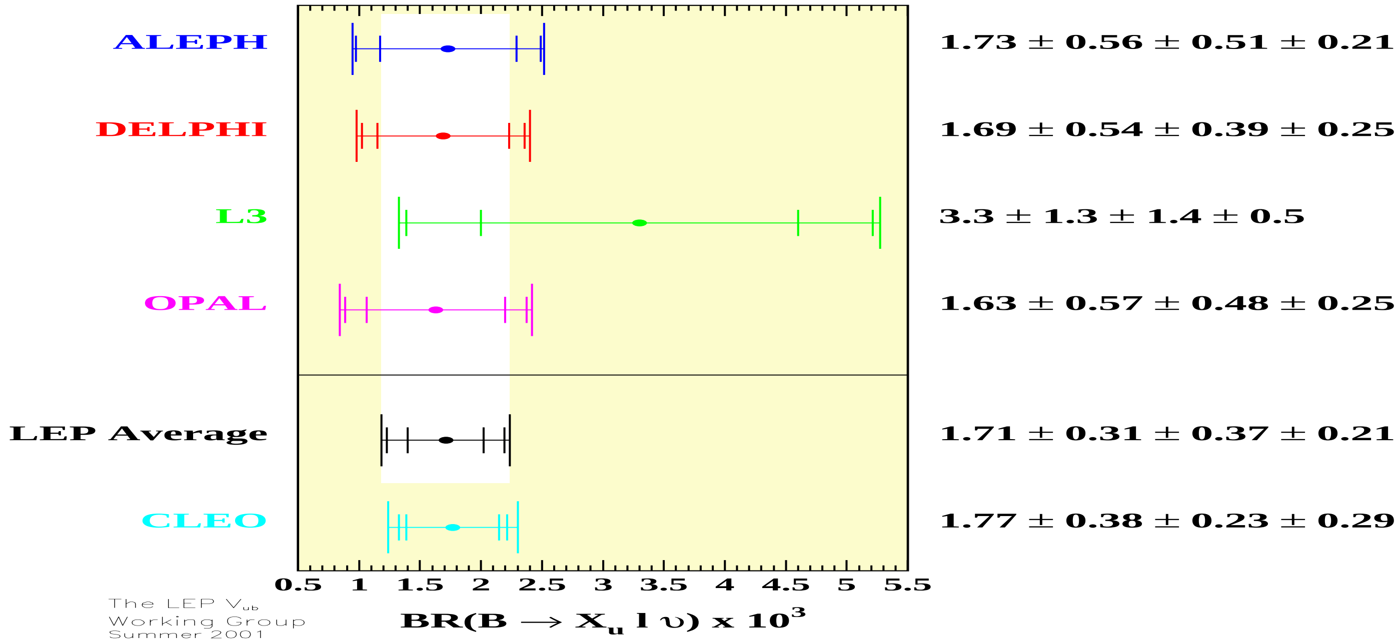
Theory predictions valid for fully inclusive or $M_X^2 < M_D^2$ and $q^2 > (M_B - M_D)^2$ regions need to be confronted to final acceptance of experimental analyses:



✧ Verify effects of cuts, resolution and discriminant variable combinations in experimental analysis.

✧ Verify phase space sampling due to significant variations in S/B over full acceptance.

The BR($b \to X_u \ell \nu$) Average



$$\mathrm{BR}(\mathrm{b} \to \mathrm{X_u}\ell\nu)^{LEP} = (1.71 \pm 0.31\ (\mathrm{stat.} + \mathrm{det.}) \pm 0.37\ (b \to c) \pm 0.21\ (b \to u)) \times 10^{-3}$$

$$\mathrm{BR}(\mathrm{b} \to \mathrm{X_u}\ell\nu)^{CLEO} = (1.77 \pm 0.29\ (\mathrm{stat.} + \mathrm{exp.}) \pm 0.38\ (\mathrm{extrapolation})) \times 10^{-3}$$

Inclusive $|V_{ub}|$ Determinations

(M. Battaglia, A. Warburton, N. Uraltsev)

$|V_{ub}|$ value extracted using Heavy Quark Expansion:

(N Uraltsev *et al*, EPJ. **C4** (1998) and AH Hoang *et al.*, PRL **82** (1999))

$$|V_{ub}| = 0.00445 \times \left(\frac{\mathrm{BR}(b \to X_u \ell \nu)}{0.002} \frac{1.55\mathrm{ps}}{\tau_b}\right)^{\frac{1}{2}} \times (1 \pm 0.020(\mathrm{pert.}) \pm 0.052(\mathrm{m_b}))$$

assuming $m_b^{kin}(1 \text{ GeV}) = 4.58 \pm 0.09$ GeV

LEP Average

$$|V_{ub}| = (4.09 \; ^{+0.36}_{-0.39}(\mathrm{stat.} + \mathrm{exp.})^{+0.42}_{-0.47}(\mathrm{b} \to \mathrm{c}) \; ^{+0.24}_{-0.26}(\mathrm{b} \to \mathrm{u}) \pm 0.21(\mathrm{HQE})) \times 10^{-3}$$

End-Point CLEO

$$|V_{ub}| = (4.12 \; \pm 0.44(\mathrm{stat.} + \mathrm{syst.}) \pm 0.27(\mathrm{b} \to \mathrm{c}) \pm 0.33(\mathrm{b} \to \mathrm{u}) \pm 0.21(\mathrm{HQE})) \times 10^{-3}$$

✧ First exercise to define correlated systematics between the CLEO inclusive and the LEP results to extract a combined inclusive V_{ub}.

✧ Assume fully correlated $b \to c$, $b \to u$, τ_b and HQE uncertainties:

VERY PRELIMINARY

$$(\delta|V_{ub}|/|V_{ub}|)^{LEP+CLEO}_{incl} = \pm 14\%$$

✧ effort just started to come to understanding on systematics, correlations and engage theorists for inputs

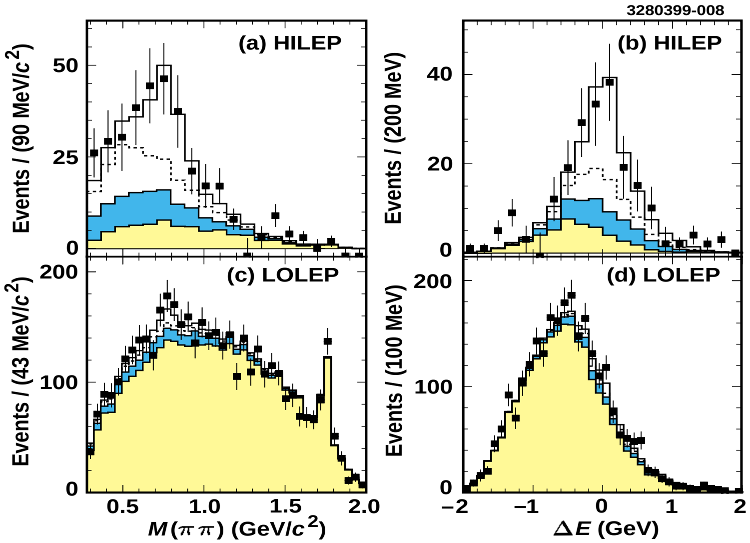
✧ re-extract result for DELPHI analysis using $d\Gamma/dM_X$ from CLEO E_γ spectrum and check consistency.

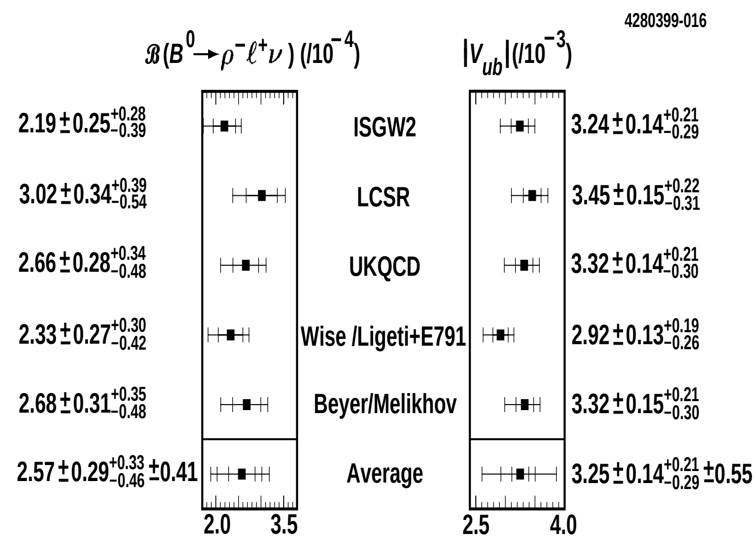
Exclusive $|V_{ub}|$ Determinations

(B. Serfass)

Determination from Exclusive $B_d^0 \to \rho^- \ell^+ \nu$ Decays

CLEO Result (CLEO 99-3)





$$|V_{ub}| = (3.25 \pm 0.14 \text{ (stat.) } ^{+0.21}_{-0.29} \text{ (syst.) } \pm 0.55 \text{ (model) }) \times 10^{-3}$$

Preliminary BaBar Result (20.2 fb^{-1}, ISGW2 Model)

$$|V_{ub}| = (3.68 \pm 0.35 \text{ (stat.) } ^{+0.28}_{-0.37} \text{ (syst.) } \pm \ldots \text{ (model) }) \times 10^{-3}$$

(S. Hashimoto)

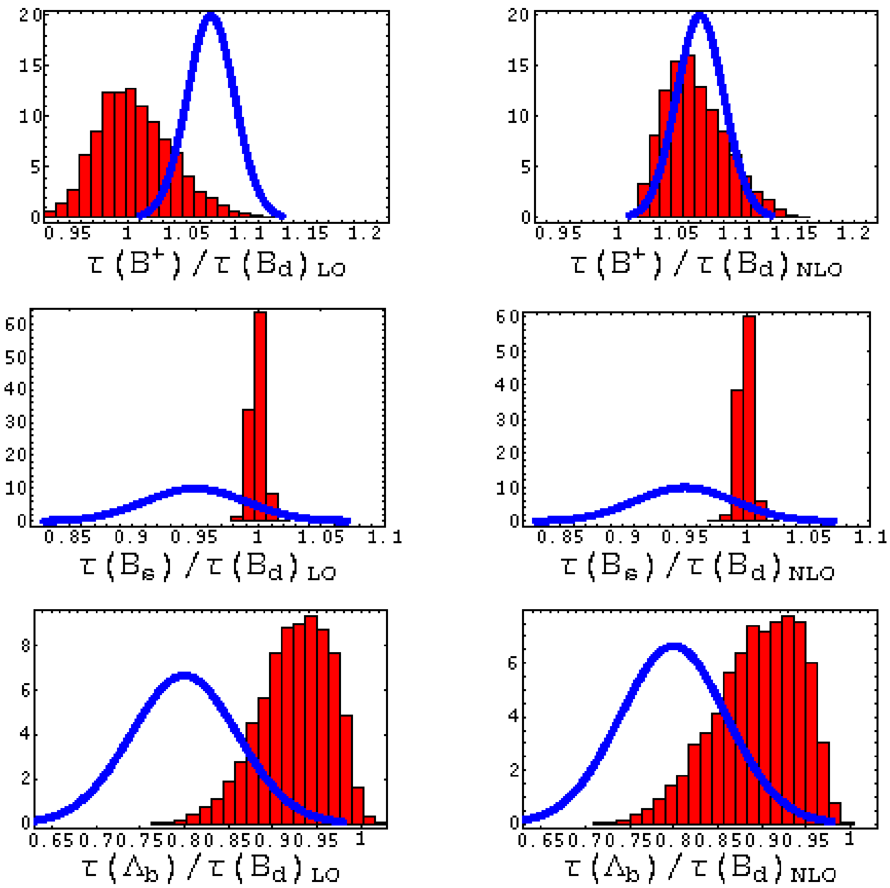
Future directions

- extend toward lower q^2 to use more experimental data
  — more experimental data can be used if the available region is extended toward lower q^2.
  — Becirevic-Kaidalov model, Dispersive bound.
- Ratio $B \to \pi l \nu$ / $D \to \pi l \nu$ to reduce errors
  — large amount of statistical and systematic errors cancel.
  — calculate the $\mathbf{1}/M$ correction.
- $P \to V l \nu$ for a consistency check
  — pioneering work by UKQCD. need more study like in $B \to \pi$.
- Unquenching to be truly model-independent
  — necessary anyway.
  — consider the chiral log more seriously.

A mini-review: lattice calculation of heavy-to-light meson decay form factors – p.11

(A. Lenz)

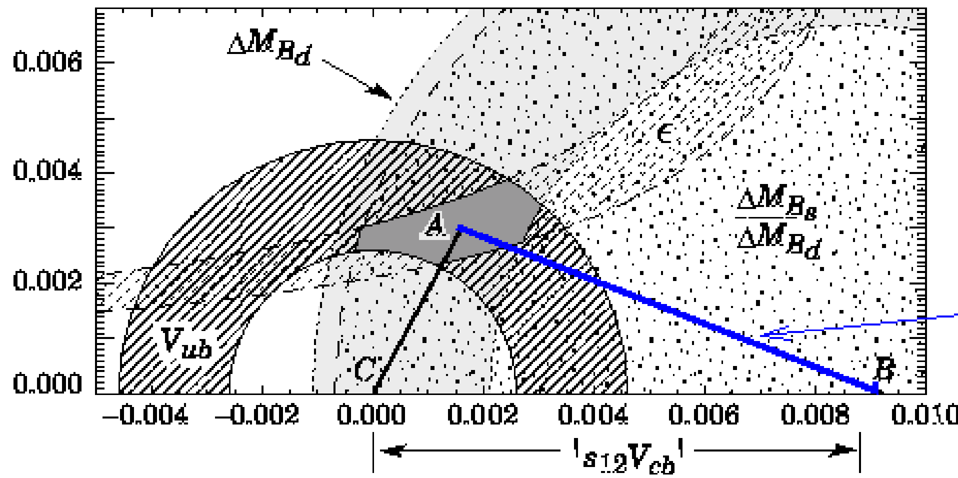
Results for τ_{B^+}/τ_{B_d}, τ_{B_s}/τ_{B_d} and $\tau_{\Lambda_b}/\tau_{B_d}$



Theoretical (histogram) vs experimental (solid line) distribution of lifetime ratios. The theoretical predictions are shown at the LO (left) and NLO (right).

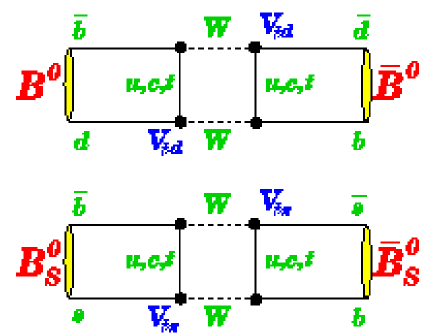
E. Franco, V. Lubicz, F. Mescia, C. Tarantino

Summary of Working Group II: Experimental Aspects



Manfred Paulini
16 February 2002
CKM Workshop
CERN, Geneva

- **WG II:** $\frac{|V_{td}|}{|V_{ts}|}$



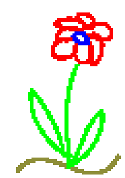
$$\Delta m_d = \frac{G_F^2}{6\pi^2} m_B (f_B^2 B_B) \eta_B m_t^2 F\left(\frac{m_t^2}{m_W^2}\right) |V_{tb}^* V_{td}|^2$$

Experiment — **Theory: => Jonathan F.**

What we actually want:

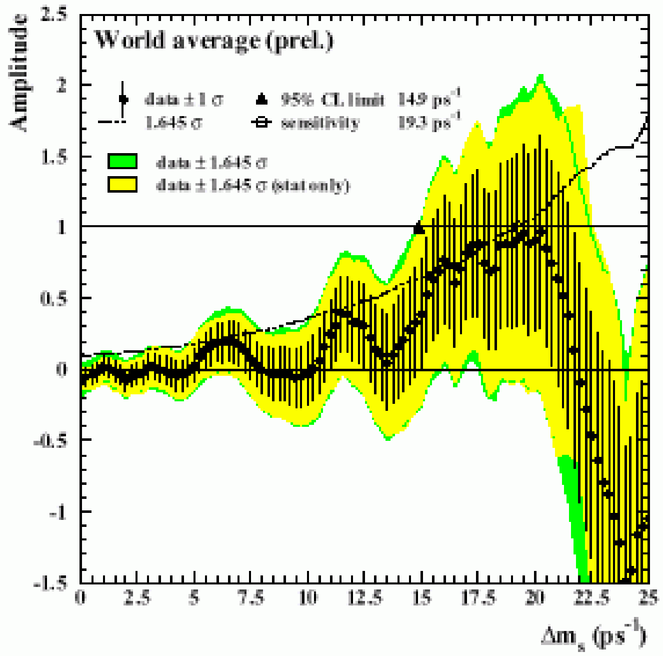
$$\frac{\Delta m_S}{\Delta m_d} = \frac{m_{B^0_S}}{m_{B^0}} \frac{f^2_{B^0_S} B_{B^0_S}}{f^2_{B^0} B_{B^0}} \frac{|V_{ts}|^2}{|V_{td}|^2}$$

ξ^2



III Experimental results

Data of the different experiments can be combined using A and σ_A as a function of Δm_s .
Exclusion at 95% CL : $(A + 1.645\,\sigma_A) < 1$.
Preliminary New ALEPH data included Febr 2002



No B_s oscillations observed:

Combined limit $\Delta m_s > 14.9\ ps^{-1}$ at 95% CL.

Sensitivity $\Delta m_s = 19.3\ ps^{-1}$
However, a hint of a signal around 17 ps^{-1}

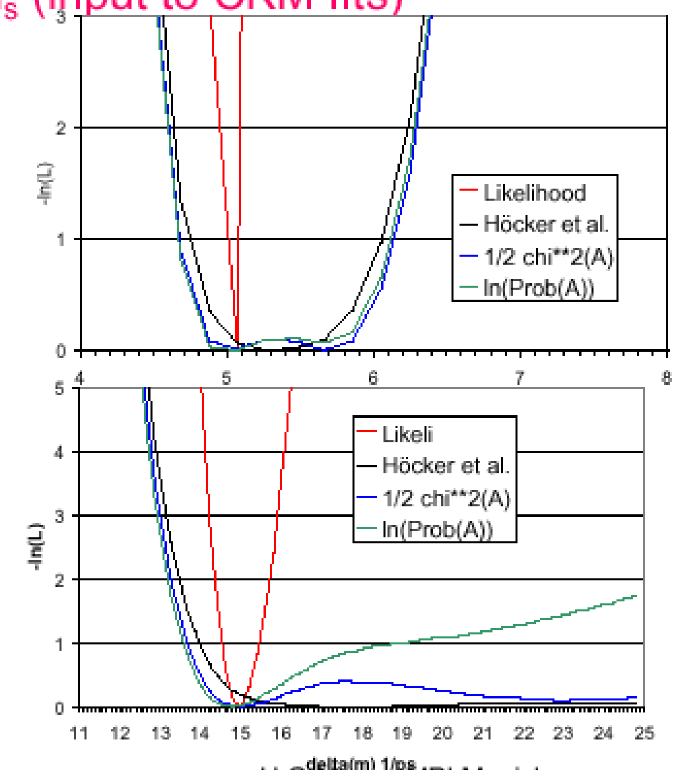
(H.G. Moser)

Estimator for Δm_s (input to CKM fits)

Several approaches to use A-fit information in CKM fits:

1) ½ $[(1-A)/\sigma_A]^2$ ´χ2-probability´
2) Modified χ2-prob. (H.Höcker et al., hep-ph/0104062, 2001)
3) $-\ln[1/(\sqrt{2\pi}\sigma_A)\exp(-(1-A)^2/2\sigma_A^2)]$
4) Likelihood: $-\ln(L) = (1/2 - A)/\sigma_A^2$ (M. Ciuchini et al., JHEP 0107:013,2001)

Shown is the limit of large statistics. Only likelihood gives a reasonable information (correct minimum, width)



CKM Workshop, CERN, February 2002

H.G.Moser, MPI Munich

Agreement that amplitude information should be included in CKM fits using likelihood method

Future of Δm_s

Prospects from CDF: (C. Paus)

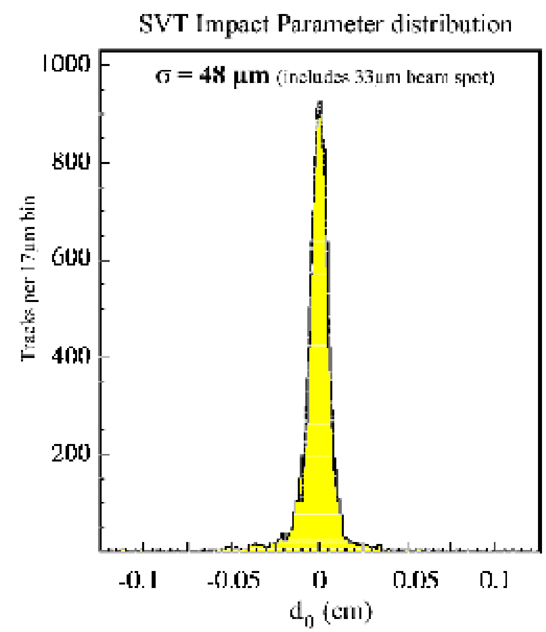
Some Realities

Tevatron run plan

- deliver:
  - 70 fb^{-1} until summer;
  - 300 fb^{-1} until end 2002;
- CDF: log at least 80% to tape

CDF status

- SVT trigger works!!
- not as efficient as expected
- silicon mostly commissioned!!
- innermost layer (L00) somewhat behind
- no B_s mixing until summer



Resolutions as expected!!

Ch. Paus, *CKM* Workshop, Feb 14, 2002 - 10

No Bs mixing for summer 2002

10 Manfred Paulini CKM Workshop CERN 16 Feb 2002

(F. Parodi)

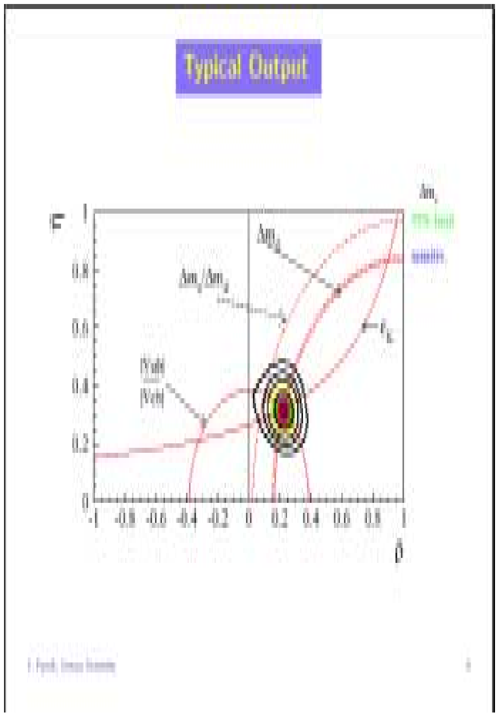
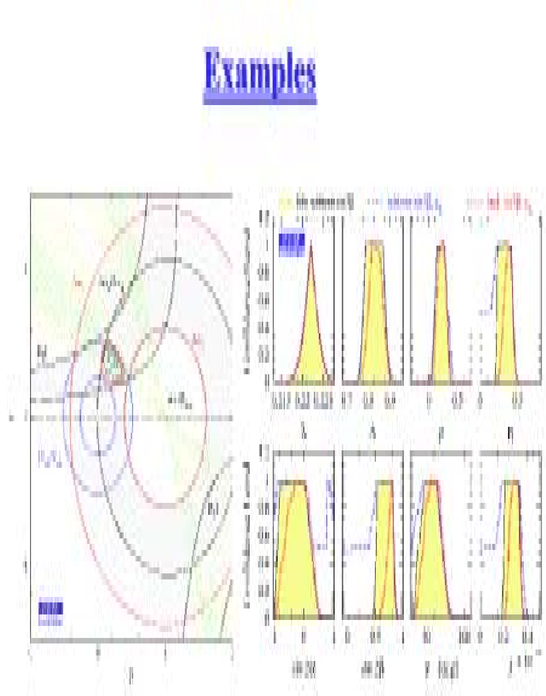
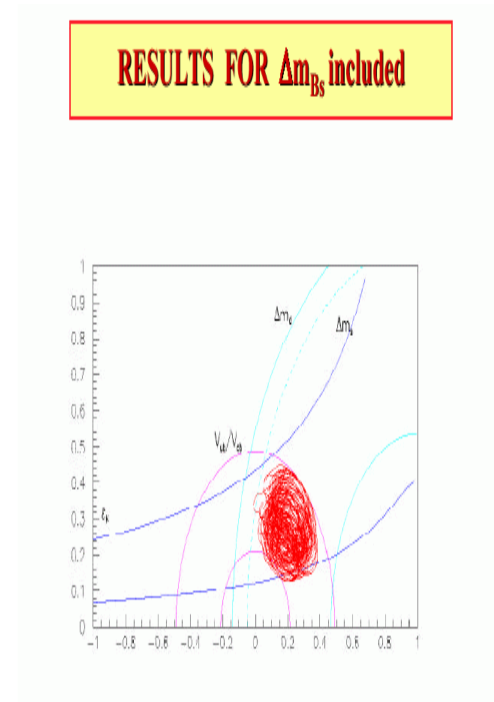
CKM Fits

A lot of useful and stimulating discussions in the last few months and during the Workshop !
And a rich CKM-Fit session:

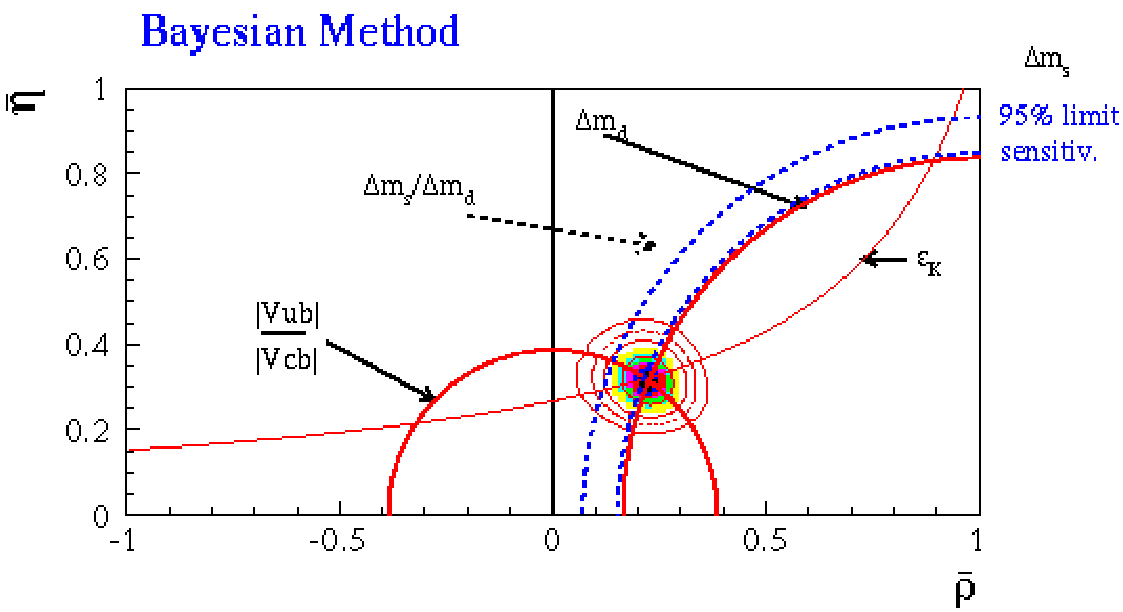
- ▷ PDG Fit (B. Renk)
- ▷ Bayesian Fit (F.P.)
- ▷ Rfit (H. Lacker)
- ▷ Scanning method (G. Eigen)
- ▷ Fit comparison (A. Stocchi)

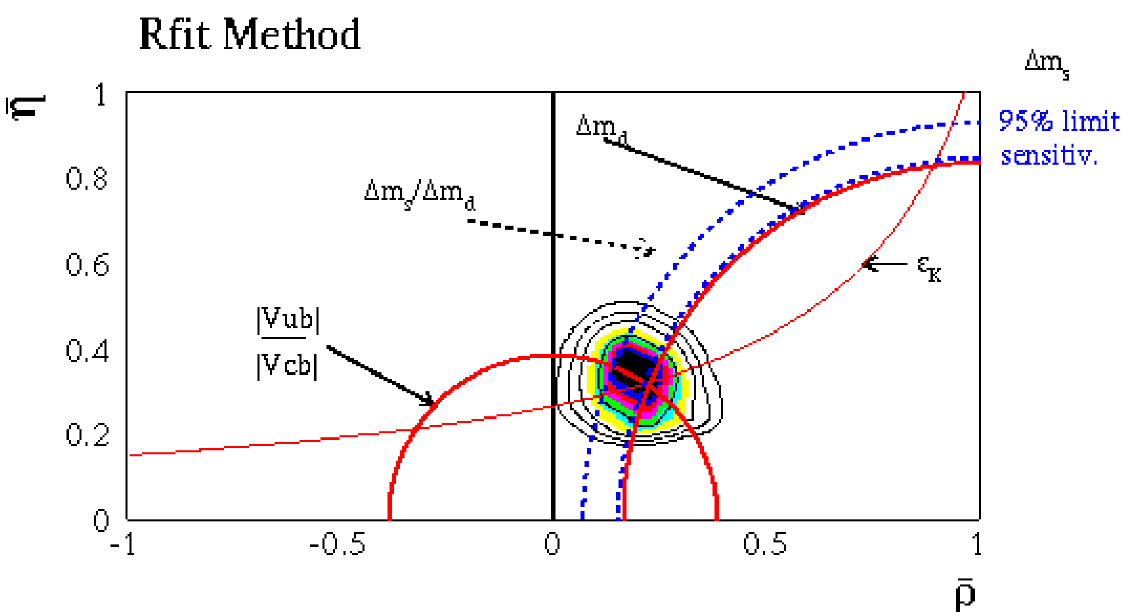
Thank to all the other people contributing to the work of this subgroup !

✧ Comprehensive review of different UT fit techniques and comparisons based on common set of input parameters:

Bayesian	**RFit**	**UTFit**
F. Parodi	E. Lacker	G. Eigen
		

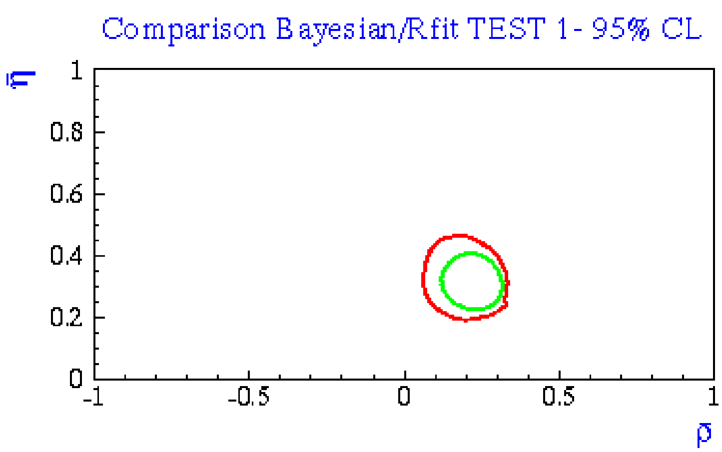
(A. Stocchi)

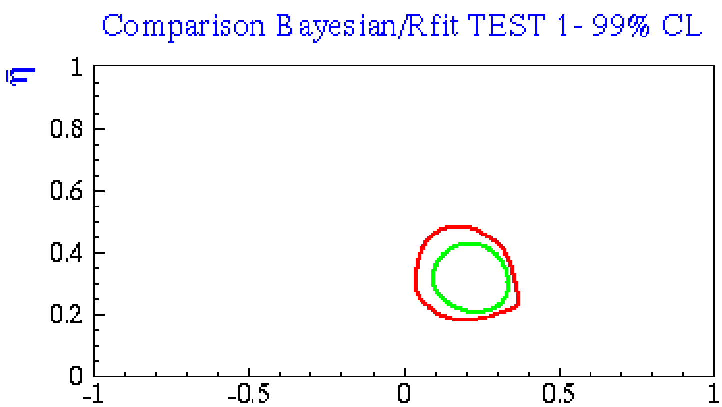

Bayesian Method
$\bar{\eta}$
1
0.8
0.6
0.4
0.2
0
-1
-0.5
0
0.5
1
$\bar{\rho}$
Δm_s
95% limit
sensitiv.
Δm_d
$\Delta m_s/\Delta m_d$
ε_K
|Vub|
|Vcb|


Rfit Method
$\bar{\eta}$
1
0.8
0.6
0.4
0.2
0
-1
-0.5
0
0.5
1
$\bar{\rho}$
Δm_s
95% limit
sensitiv.
Δm_d
$\Delta m_s/\Delta m_d$
ε_K
|Vub|
|Vcb|

Ratio for confidence levels Rfit/Bayesian

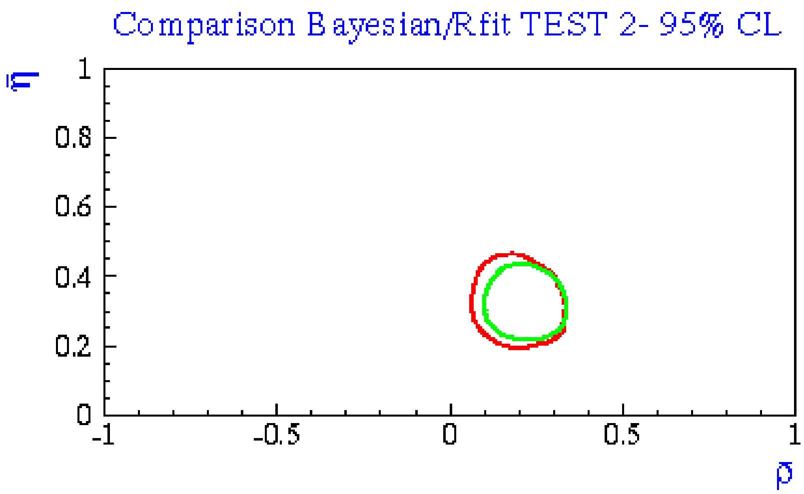
Parameter	5% CL	1% CL	0.1% CL	0.01% CL
$\bar{\rho}$	1.4	1.3	1.3	1.3
$\bar{\eta}$	1.7	1.5	1.3	1.3
$\sin 2\beta$	1.6	1.4	1.3	1.2
γ (degrees)	1.6	1.5	1.3	1.3



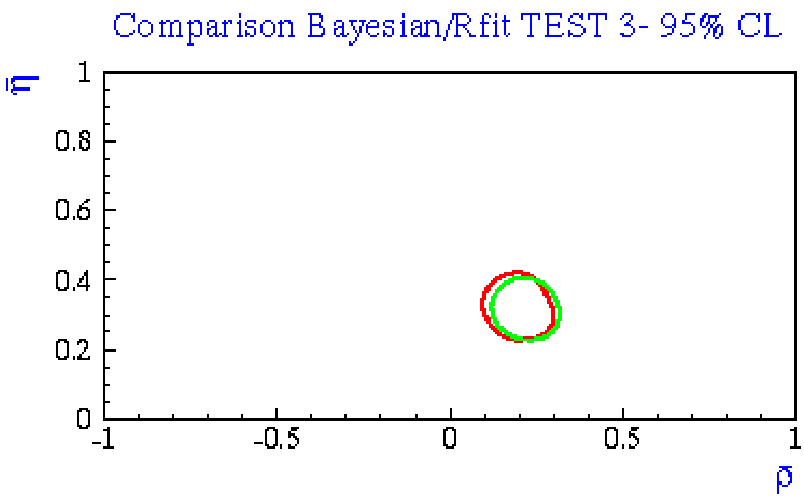


Both methods used the same Likelihoods.

Likelihoods taken as obtained from Rfit (linear sum of Theoretical and Gaussian error) :



Likelihoods taken as obtained from convolution (sum in quadrature of Theoretical and Gaussian error) :

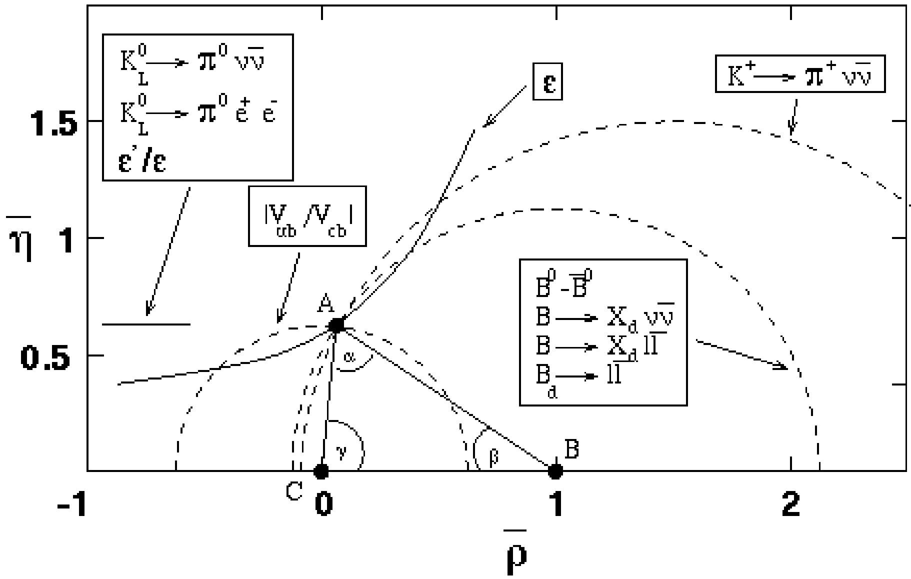


Differences almost disappeared

What about Rare K Decays?

(D. Jaffe)

Grand view of CKM triangle:



Kaon Experiments:

$K^+ \to \pi^+ \nu\bar{\nu}$

- E787 (BNL): 2 events
- E949 (BNL): future DOE funding? expect 5–10 SM events
- CKM (FNAL): goal 100 SM events

$K_L^0 \to \pi^0 \nu\bar{\nu}$

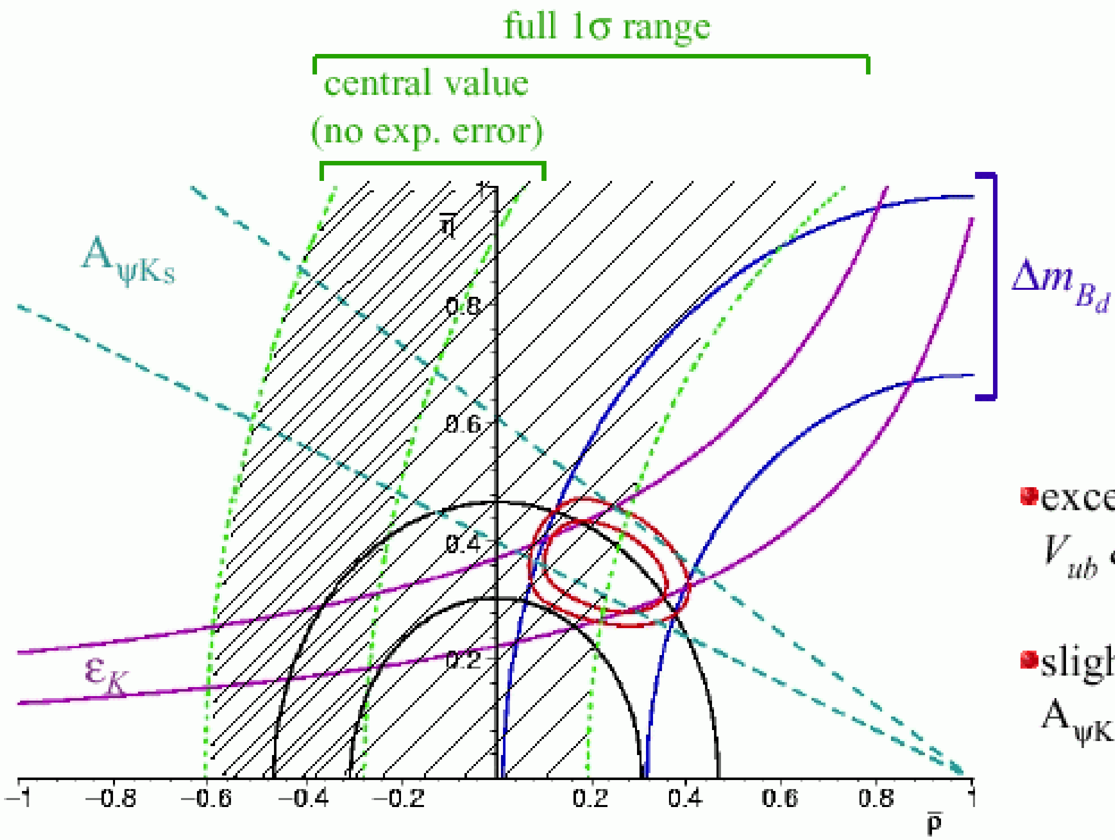
- KOPIO (BNL): goal 40 SM events
- JHF (KEK): goal 1000 SM events

Exciting rare kaon results in 2010 ?

12 Manfred Paulini CKM Workshop CERN 16 Feb 2002

(G. Isidori)

IMPACT OF E-787 $K^+ \to \pi^+ \nu \bar{\nu}$ RESULT ON UT



- excellent agreement with V_{ub} & ε_K
- slight disagreement with $A_{\psi K_S}$ & Δm_{B_d} [$\Delta B=2$]

Dr.James Decker
Acting Director of the Office of Science
Department of Energy
1000 Independence Av, S.W.
Washington,D.C. 20585
U.S.A.

Dear Dr.Decker,

The participants of the international *Workshop on the CKM Unitarity Triangle* held at CERN, Geneva, 13-16 february 2002, are very concerned about the absence of funding in the president's budget for 2003 for the running of experiment E949 at BNL, performed by an international team with major Canadian, Japanese, and Russian contributions.

This is a very important experiment in the physics of flavours, done by an excellent experimental team. The discovery of 2 events of the type $K^{\rightarrow}\pi^{+}\nu\bar{\nu}$ by this team was a milestone in flavour physics. The continuation of the upgraded experiment E949 is of fundamental importance, and complementary to the physics of B mesons which the DOE supports in a very substantial way.

If this highly promising experiment is not supported further now, after large investments of all collaborating institutes for the upgrade of the detector, this would seriously jeopardize fundamental front-line physics. Furthermore it would influence the confidence of the international physics community in the reliability of US funding for common collaborative efforts.

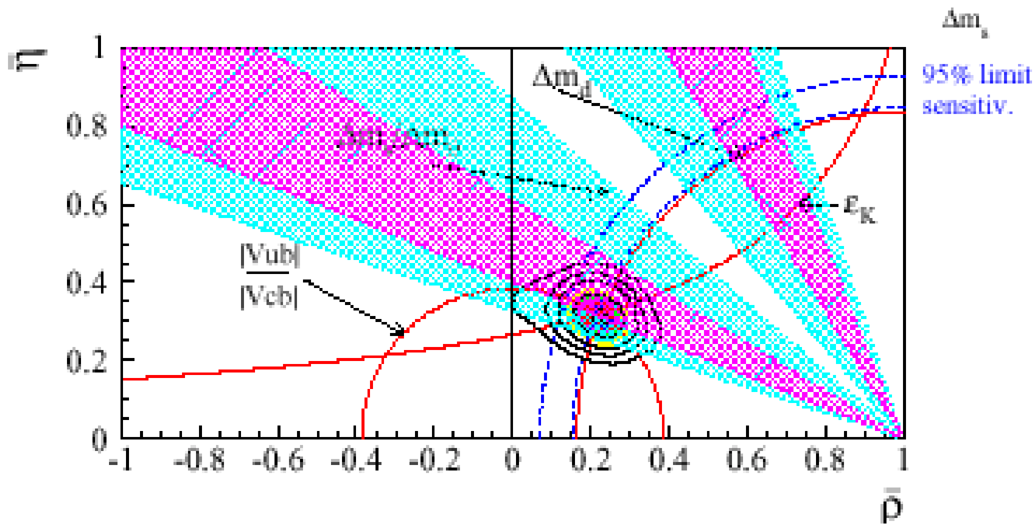
We therefore urge you to explore all possible ways of restoring the 2003 funding for this important project approved by DOE, and give BNL the chance of obtaining a first-class result of great significance.

Sincerely,

(F. Parodi)

Fit update with inputs from WG I and II

Last minute update with the bayesian fit.
All the intervals are given at 95% C.L.



now	before
$\bar{\rho} \in [0.14, 0.30]$	$[0.14, 0.30]$
$\bar{\eta} \in [0.24, 0.39]$	$[0.25, 0.39]$

✧ A successful workshop in terms of participation and results: elucidations of open issues, discussion and inputs for crucial future measurements.

✧ Proceedings to appear by Fall in CERN Yellow Book series (Editorial board being appointed, responsability for collecting material and write-up of individual chapters with WG conveners).

✧ Second part to address issues relevant to the B physics programme at LHC and review the status of the new data from the B Factories and the Tevatron and recent theoretical progresses. Special emphasis will be put in assessing the sensitivity to New Physics at time of the LHC running.

✧ Interim meeting in Spring 2003 in UK (Durham or Lake District) to present the proceedings, update results from B factories and Tevatron and launch activity of new working groups (Angles, New Physics).


Workshop on the CKM Unitarity Triangle
CERN Geneva 2002-2003
First meeting February 13-16, 2002
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http://cern.ch/ckm-workshop