CKMlive tutorial

The CKMfitter group

CKMfitter

CKMfitter and CKMlive

CKM fitter group

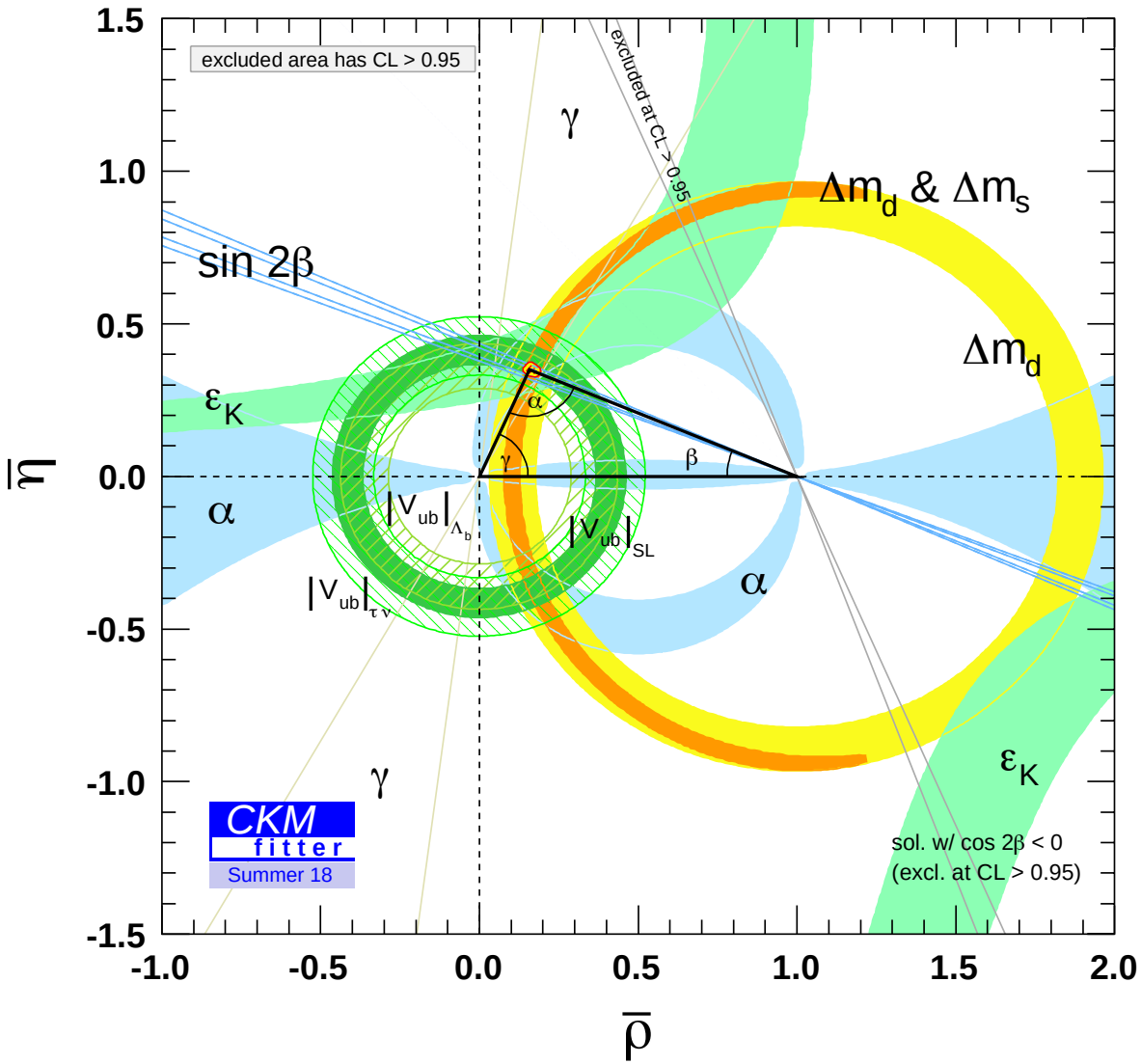
- Group of theorists and experimentalists in flavour physics
- Determination of the parameters of the CKM matrix from experimental data and theoretical inputs
- Based on a frequentist statistical framework with specific model for theoretical uncertainties

CKMlive

- Web-interface for simplified analyses
- Determination of theoretical parameters with numerical and graphic outputs
- Will be the main focus of this tutorial

Please go first to `http://ckmlive.in2p3.fr`
using Firefox in order to register (sign in)

The current status of CKM



$|V_{ud}|$, $|V_{us}|$, $|V_{cb}|$, $|V_{ub}|_{SL}$

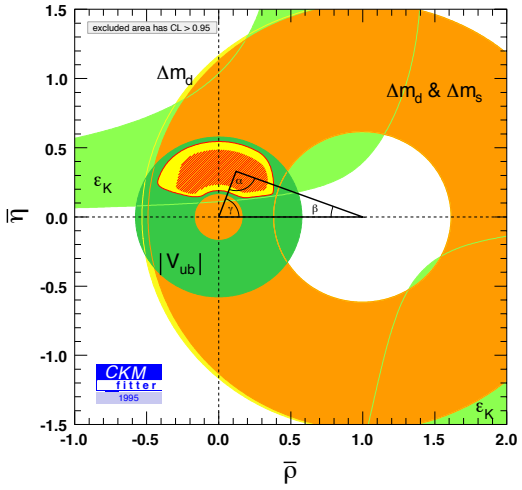
$B \to \tau\nu$

Δm_d, Δm_s, ϵ_K

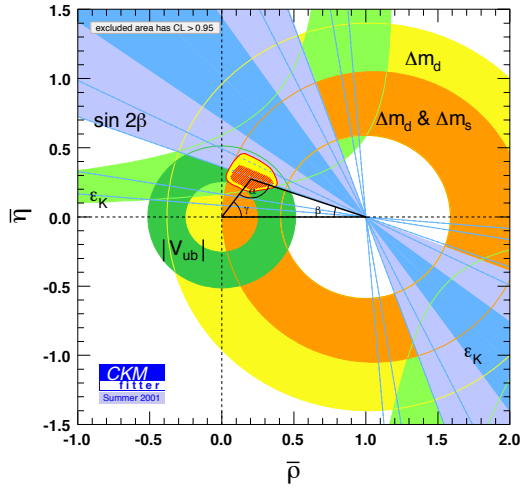
α, $\sin 2\beta$, γ

$$A = 0.840^{+0.005}_{-0.020}$$
$$\lambda = 0.2247^{+0.0003}_{-0.0001}$$
$$\bar{\rho} = 0.158^{+0.010}_{-0.007}$$
$$\bar{\eta} = 0.349^{+0.010}_{-0.007}$$
(68% CL)

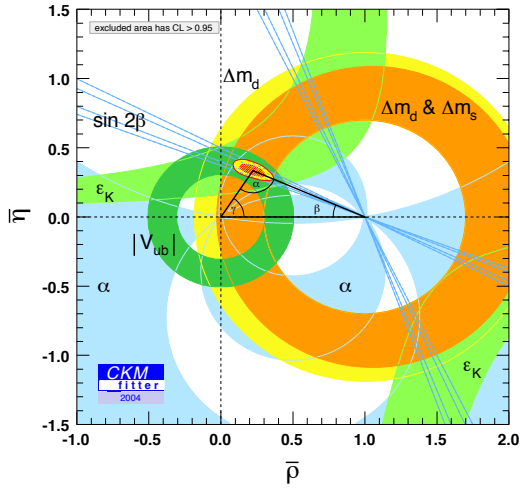
Two decades of CKM



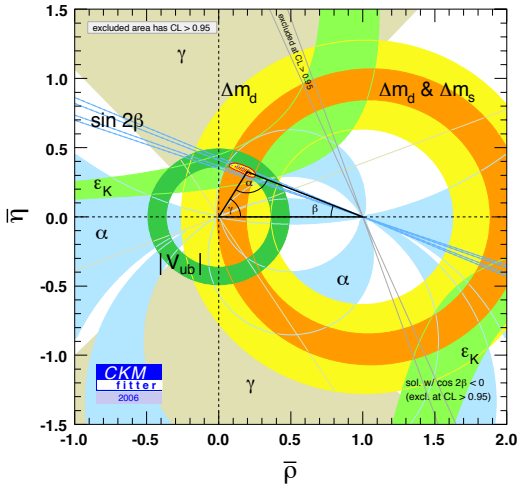
1995



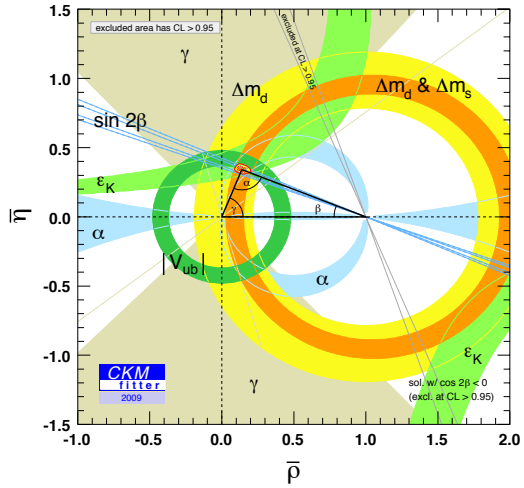
2001



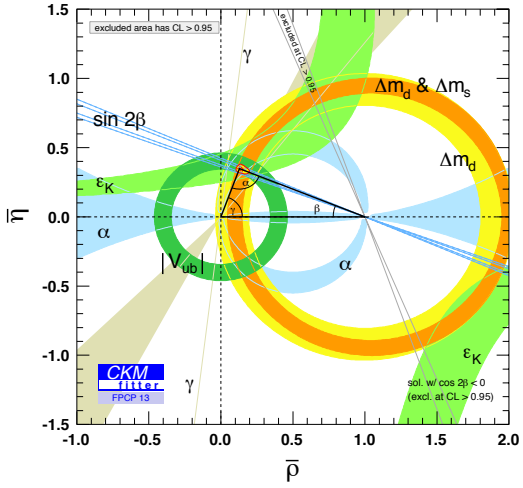
2004



2006



2009



2013

A frequentist framework to implement

$p = (A, \lambda, \bar{\rho}, \bar{\eta} \ldots) = (q, r)$

- q parameters of interest (CKM), r nuisance parameters (hadronic)
- $\mathcal{O}_{\rm meas} \pm \sigma_{\mathcal{O}}$ experimental values of observables
- $\mathcal{O}_{\rm th}(p)$ theoretical description in a given model

$$\mathcal{L}(p) = \prod_{\mathcal{O}} \mathcal{L}_{\mathcal{O}}(p) \qquad T(p) = -2 \ln \mathcal{L}(p) = \sum_{\mathcal{O}} \left(\frac{\mathcal{O}_{\rm th}(p) - \mathcal{O}_{\rm meas}}{\sigma_{\mathcal{O}}} \right)^2$$

$$\chi^2(q) = \min_r T(q, r)$$

- Central value: estimator $\hat{q}$ max likelihood $\quad \chi^2(\hat{q}) = \min_q \chi^2(q)$
- Range: confidence level (p-value) for q_0 computed from $\Delta\chi^2(q_0) = \chi^2(q_0) - \min_q \chi^2(q)$, assuming χ^2 law with $N = dim(q)$
- Specific (Rfit) treatment of theoretical uncertainties modifying $\mathcal{L}$, and impacting the procedure to average measurements

CKMfitter software

General objectives for CKM fitter

- Experimentalists and theorists working together
- Frequentist determination of CKM parameters from observables
- Large number of inputs, significant theoretical uncertainties
- Numerically demanding, with many scans and minimisations (in particular w.r.t nuisance parameters)

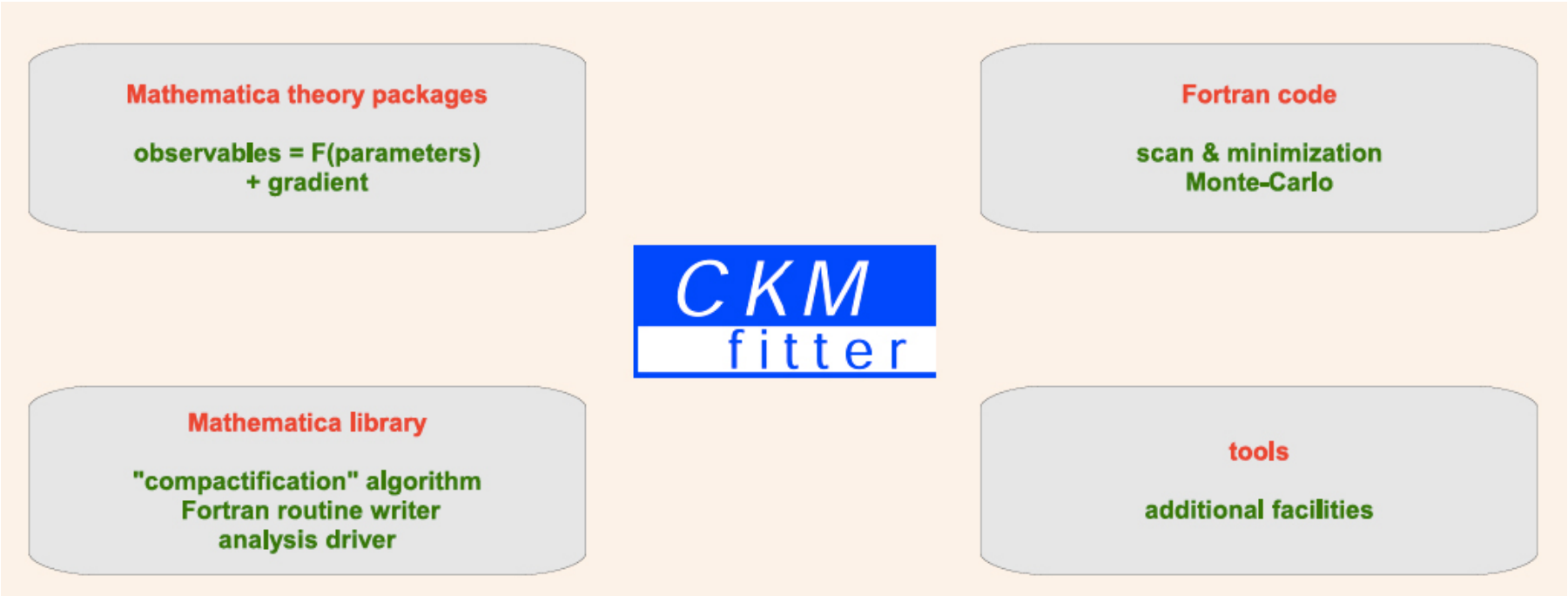
First version of the software (up to 2005)

- Fortran code + Minuit minimisation
- Fortran: legibility/modularity difficult to maintain
- Minuit: numerical determination of first derivatives (gradient)

Second version of the software (from 2005)

- Fastfitter=Mathematica code + Fortran routines
- Mathematica: building of χ^2 and computation of first derivatives
- Fortran: minimisation using publicly available, MINUIT-like routines

CKMfitter current implementation



- Theory packages: express observables (branching ratios...) in terms of parameters ($A, \lambda \ldots$)
- Libraries: compactification algo to identify subexpressions repeated in obs and derivatives for quick numerical computation
- Fortran code: numerical minimisation
- Tools: ROOT routines to draw the plots

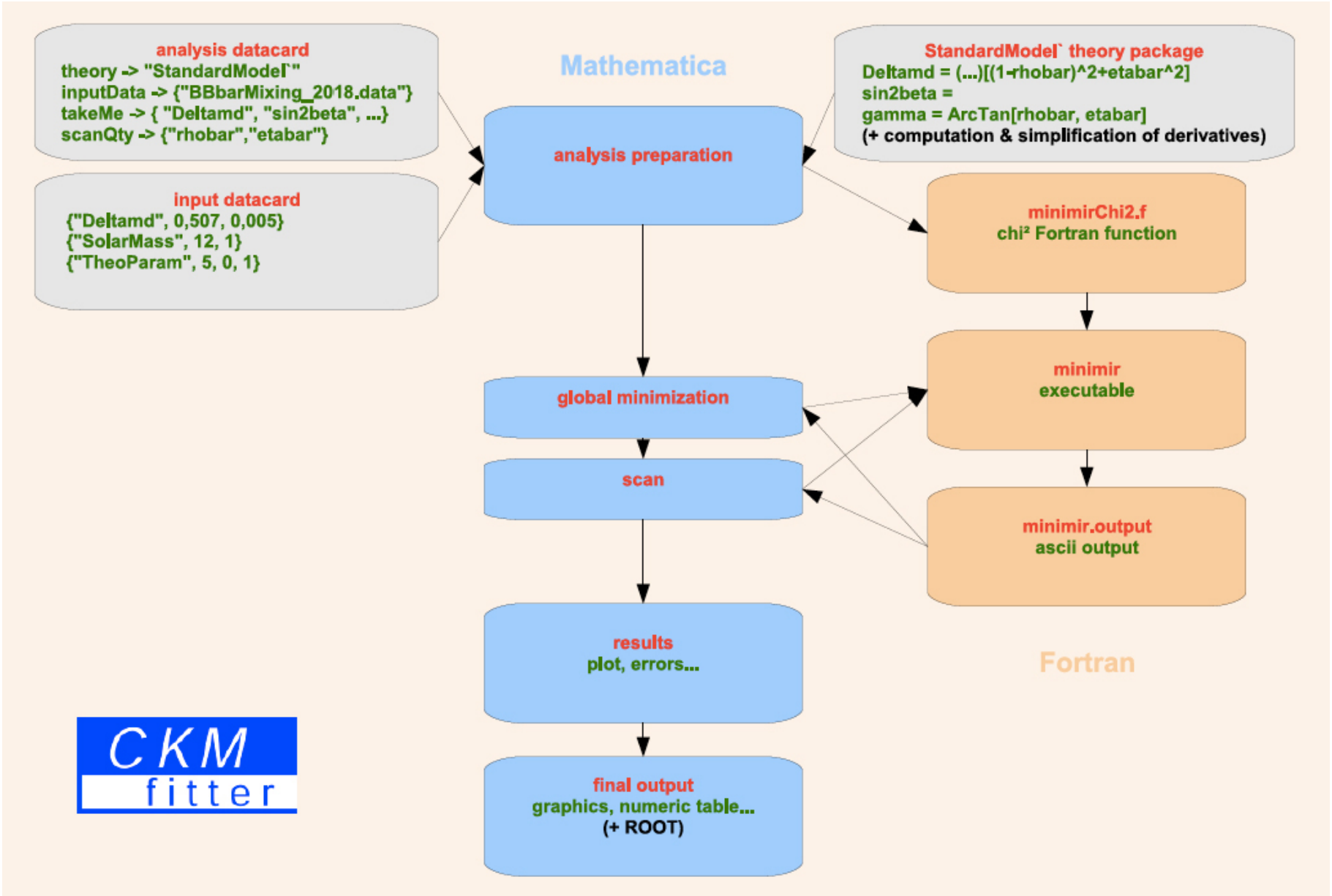
Elements for an analysis

- Mathematica theory packages
  - observables (branching ratios...) in terms of parameters ($A, \lambda \ldots$)
  - compute derivatives and simplify expressions once and for all
  - possibility to define several models (SM, NP)
- Input datacards
  - list of inputs at a given date (PDG, HFLAV, FLAG...)
  - observables (measurements) but also parameters (lattice QCD inputs for hadronic params)
- Analysis datacard
  - Theories to be considered
  - Inputs to be considered
  - Parameter(s) to be scanned and constrained
  - Plots to be drawn

Modularity of the approach, allowing to add new elements easily

χ^2 function to be minimised build for the analysis chosen

Analysis flow chart



Theory packages

- Express observables in terms of parameters, in a given model
- Compute observables and first derivatives after simplification
- Store the results in anciliary files used later to build χ^2

  - CKMmatrix : Definition of the various CKM-related quantities
  - BBbarKKbarMixing: BBbar and KKbar mixing - related quantities
  - LeptonicDecay: Branching ratios for $B^+ \to l^+ \nu$ and similar leptonic decay
  - SemileptonicDecay: Branching ratios for K and D semileptonic decays
  - DiLeptonicDecay: Branching ratio of $B \to l^+ l^-$ and similar dileptonic decays
  - BtoDK: B -> D(*)K(*) modes, for use in gamma analyses (GGSZ, GLW, ADS)
  - BtoDTauNu: B->D tau nu / B -> D l nu branching ratio
  - BtoDpiDstarPiDrho: Neutral decay B -> D(*)π or Dρ for time dependent analysis of sin(2β+γ)
  - BtoKstPiSU2: Charmless B->Kππ Package
  - BtoPiKPiKSU3: B,Bs->ππ, Kπ, KK decays assuming SU(3) symmetry
  - BtoPiPiSU2: B→ππ analysis
  - BtoRhoPiSU2: B→ρπ analysis
  - BtoRhoRhoSU2: B→ρρ analysis
  - BtoVgam: Radiative decay observables for B -> V γ
  - BtoXsGamma: Br(B->$X_s\gamma$)
  - Charm: Charm observables
  - KtoPiLNu: Branching ratio of Kl3 decay
  - KtoPiNuNu: Branching ratio for K -> π ν νbar
  - QCD: Strong coupling constant
  - QED: α_{em}
  - VcdVcs: Constraints on Vcd and Vcs

Structure of theory package

```
BeginPackage["LeptonicDecay`",{"CKMmatrix`", "DecayBagParameters`","QCD`", "TheoryTools`"} ]
```

```
LeptonicDecay`theory::usage="B(\!\(\*SuperscriptBox[\(B\), \(+\)]\)->\!\(\*SuperscriptBox[\(e\), \(+\)]\)\!\(\*Su
  B(\!\(\*SuperscriptBox[\(Ds\), \(+\)]\)->\!\(\*SuperscriptBox[\(τ\), \(+\)]\)\!\(\*SubscriptBox[\(ν\), \(τ\)]\))
```

```
theory["SM"]={
{
{"A",A},{"λ",λ},{"\!\(\*OverscriptBox[\(ρ\), \(_\)]\)",ρbar},{"\!\(\*OverscriptBox[\(η\), \(_\)]\)",ηbar},
{"fBs",fBs},{"fBs/fBd",fBsOfBd},
{"fDs",fDs},{"fDs/fDd",fDsOfDd},
{"fK",fKLQCD}, {"fK/fπ",fKOfpi},
{"δKl2Rad",δKl2Rad}, {"δτK2Rad", δτK2Rad }
},
{"B(B->eν)","B(B->μν)",
"B(B->τν)","B(D->eν)",
"B(D->μν)",
"B(Ds->eν)","B(Ds->μν)",
"B(Ds->τν)","B(K->eν)",
"B(K->μν)","B(τ->Kν)",
"Ke2/πe2","Kμ2/πμ2",
"τK2/τπ2","fBd",
"fDd","fπ"}
}
```

```
theory["NP(H+)"]={
{
{"A",A},{"λ",λ},{"\!\(\*OverscriptBox[\(ρ\), \(_\)]\)",ρbar},{"\!\(\*OverscriptBox[\(η\), \(_\)]\)",ηbar},
{"fBs",fBs},{"fBs/fBd",fBsOfBd},
{"fDs",fDs},{"fDs/fDd",fDsOfDd},
{"fK",fKLQCD}, {"fK/fπ",fKOfpi},
{"δKl2Rad",δKl2Rad}, {"δτK2Rad", δτK2Rad },
{"tanβ",tanbeta},{"mH+",mHch},{"eps0",eps0},
{"mUbar",mUbar},{"mdbar",mdbar},{"msbar",msbar},{"\!\(\*OverscriptBox[\(mc\), \(_\)]\)",mcbar}, {"mbbar",mbbar}
},
{"B(B->eν)","B(B->μν)",
```

Input datacard

```
{
    (*   Input datacard for SM global CKM fit  *)
    (*            used for Summer 18          *)

(*****************************************************************)
(* CKM moduli *)
(*****************************************************************)

{"|Vud|", 0.97420, 0, 0.00021}, (* Towner/Hardy: Proceeding in CKM2016, https://
pos.sissa.it/291/028/pdf *)

{"|Vus|xF+Kpi(0)", 0.2165, 0.0004},  (* PDG 16 *)

{"F+Kpi(0)", 0.9681, 0.0014, 0.0022},
(* see document AVERAGE OF LATTICE QCD INPUTS FOR CKM FITS *)

{"|Vub|",  3.98 10^-3, 0.08 10^-3, 0.22 10^-3 },
(* Summer 2018 update *)
{"|Vcb|", 41.8 10^-3, 0.4 10^-3, 0.6 10^-3},
(* Summer 2018 update *)

(* Inclusive and exclusive values averaged in the above *)
{"|Vub|slincl",  4.44*10^(-3),0.17*10^(-3),0.31*10^(-3)},(* Summer 2018 update *)
{"|Vub|slexcl",  3.72*10^(-3),0.09*10^(-3),0.22*10^(-3)},
{"|Vcb|slincl", 42.2*10^(-3),0.4*10^(-3),0.6*10^(-3)},(* Summer 2018 update *)
{"|Vcb|slexcl", 41.2*10^(-3),0.6*10^(-3),1.1*10^(-3)},(* Summer 2018 update *)

(* |Vub|/|Vcb| from Lambda b decays *)
{"gamma(lambdab->p)/gamma(lambdab->lambdac)",0.947*10^(-2),Sqrt[0.043^2+0.069^2]*10^(-2)},
  (* http://arxiv.org/pdf/1504.01568.pdf,updated according to new Lambda_c->pkpi Br,
http://www-f9.ijs.si/~zupanc/hfag-Lambda_c.pdf *)

{"zetap[15-q2max]/zetalambdac[7-q2max]",1.471,0.096, 0.290},
  (* see document AVERAGE OF LATTICE QCD INPUTS FOR CKM FITS *)

{"All(Vub/Vcb)", "gamma(lambdab->p)/gamma(lambdab->lambdac)","zetap[15-q2max]/zetalambdac[7-
```

Input datacard format

input type	meaning	syntax
"Fixed"	x = 12	{"x",12}
"Gauss"	x = 12 +-4(stat)	{"x",12,4}
"GaussAsym"	x = 12 +5(stat)-4(stat)	{"x",12,5,-4}
"Range"	x = 12 +-3(theo)	{"x",12,0,3}
"GaussRange"	x = 12 +-4(stat) +-3(theo)	{"x",12,4,3}
"GaussAsymRange"	x = 12 +5(stat)-4(stat) +-3(theo)	{"x",12,5,-4,3}
"Correlation"	correlation matrix (upper triangle)	{ {"x","y","z"}, 1,-0.2,0.1, 1,0.3, 1 }
"UpperLimit"	0 < x < 3.4 10^-5 @ 90% CL	{"x",{3.4 10^-5},90}
"LUT"	LookUp Table for chi^2	{"x","LUTfile.dat"} (1D) or {{"x","y"},"LUTfile.dat"} (2D)

- Range corresponds to Rfit treatment of theoretical uncertainties
- LUT corresponds to table for inputs with specific treatments (α, γ)

Analysis datacard

```
{
    analysisName -> "Vcb_",
    job -> { 1, 2, 3, 4 },
    inputData -> "Summer18/globalCKMfit_Summer18.data",
    theoryPackage->   {"BBbarKKbarMixing`","LeptonicDecay`", "DiLeptonicDecay`","SemileptonicDecay`"},
        jobName[1] -> "indirect",
        takeMe[1] -> {
            "All(Vud-Vus)","All(Vcd-Vcs)", "|Vub|",
            "All(B->taunu)","All(Vub/Vcb)",
            "All(Deltamd)",
            "All(Deltams)",
            "All(|epsilonK|)",
            "sin2beta","cos2beta",
            "alpha",
            "gamma",
            "All(B->ll)","2beta_sb"
           },
        jobName[2] -> "incl",
        replaceInput[2]->{"|Vcb|"->"|Vcb|slaver","|Vcb|slincl"->"|Vcb|"},
        takeMe[2]->{
            "|Vcb|"
        },
        jobName[3] -> "excl",
        replaceInput[3]->{"|Vcb|"->"|Vcb|slaver","|Vcb|slexcl"->"|Vcb|"},
        takeMe[3]->{
            "|Vcb|"
        },
        jobName[4] -> "aver",
        takeMe[4]->{
            "|Vcb|"
        },
        scanQty -> "|Vcb|",
        scanMin -> 0.036,
        scanMax -> 0.046,
        (**********     common settings     **********)
        startRange -> {"A"->{0.78, 0.85}, "lambda"->{0.2245, 0.2255}, "rhobar"->{0.1, 0
            .2}, "etabar"->{0.3, 0.4},"LambdaQCD"->{0.2,0.24} },
        globalMinSearches -> 500,
```

From CKMfitter to CKMlive

CKMfitter `ckmfitter.in2p3.fr`

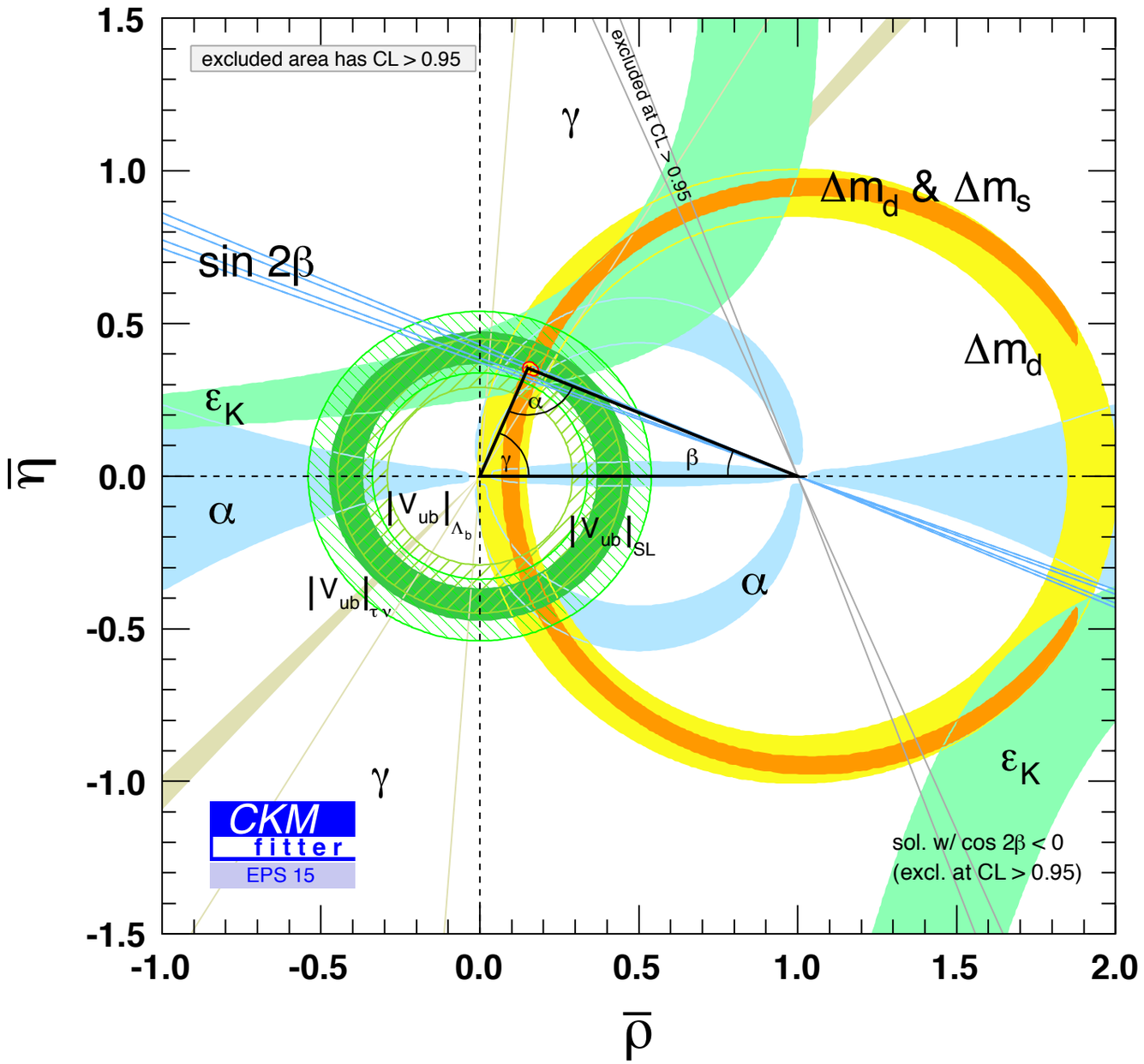
- fastfitter software very powerful and modular
- but complicated to apprehend and to maintain
- still implementing new features (large expressions, alternative treatments of theo uncertainties)
- often requests: *how the global fit would change with this input ?*

CKMlive (2015) `ckmlive.in2p3.fr`

- Web interface for standard analyses (SM global fit)
- Based on same elements as CKMfitter, more user friendly (hopefully)
- Less powerful, only limited subsets of analyses available
- Focus of this tutorial

First exercise

First exercise



- Use the same data as the global fit for EPS15
- Perform the fit for $\bar{\eta}$
- Obtain the data file, the plot and confidence interval

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2.Your analyses/Start an analysis

1.Sign in

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- Start an analysis
- Ongoing analyses
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Home - The CKMlive project and the CKMfitter group

CKMlive Web Project

CKMlive is meant to allow the High Energy Physics community to run dedicated analyses conducted with the CKMfitter software.

You must register here first. Once registered, you will be able to start analyses using the CKMfitter environment.

The CKMlive project is brought to you by **Jérôme CHARLES, Alexandre CLAUDE, Sébastien DESCOTES-GENON, Stéphane MONTEIL.** The mailing list ckmlive@clermont.in2p3.fr is available to ask any questions on the project.

Some slides introducing the project.

CKMfitter Group

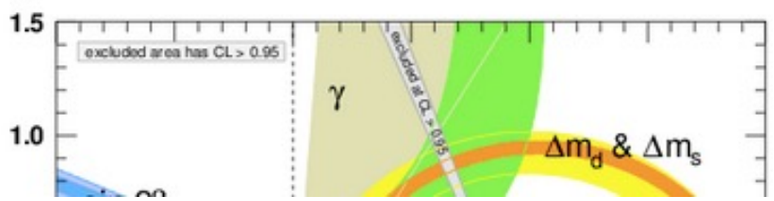
CKMfitter is a group of theoreticians and experimentalists who propose global interpretations of the Flavour Physics data in the framework of the Standard Model (SM) of Particle Physics and beyond (BSM). The involved laboratories are by alphabetical order: **CPT (Marseille), KEK (Japan), LAPP (Annecy-Le-Vieux), LPC (Clermont), LPNHE (Paris), LPT (Orsay), and the Universities of Berlin (Germany) and Melbourne (Australia).**

A rather complete description of the group and its activities (including the main results and publications) can be found here. In particular, we provide the High Energy Physics community with the metrology of the four SM parameters describing the quark flavour charged current transitions in the **Cabibbo-Kobayashi-Maskawa (CKM) paradigm**, established with frequentist statistical techniques.

CKMlive is a web interface that will allow you to perform similar analysis for given scenarios (in particular the Standard Model global fit), either taking inputs from analyses already performed by the CKMfitter group or choosing your preferred inputs.

SM global fit

In the framework of the Standard Model, charged-current quark transitions are described by the CKM matrix, which can be parameterised with four independent parameters. CKMlive allows you to perform the metrology of these parameters using experimental constraints on observables with a good control of theoretical uncertainties.



New Physics in ΔF = 2

CKMlive will be extended to flavour analyses beyond the Standard Model in the future. For instance, it is possible to introduce New Physics contributions in neutral mesons mixing processes in a model-independent way by multiplying the SM mixing matrix

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Home

Your analyses

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Analysis - Scenario & Scan constraint

Choose your scenario

Select the model and the scenario that will be the basis of your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

Name

etabar-SDG

Scan constraint

1D

Model

Standard Model

Scenario

EPS15

✖ Cancel Analysis ✔ Continue

2. Continue

1.Fill the fields one after the other

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Analysis - Target Input

Choose your target

Select the target(s), i.e., the quantity(ies) that you want to constrain through your analysis

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You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Info on params

Target observable

$|V_{ub}|$
$|V_{cb}|$
α
$\sin 2\beta$
$\cos 2\beta$
γ
Δm_d
Δm_s

A meaningful range for etabar can be between -5 and 5

Scan min of the first target (etabar)

0.3

Scan max of the first target (etabar)

0.4

Target parameter

A
λ
ρ
$\bar{\eta}$
R_b
$\frac{B_{B_s}}{B_{B_d}}$
f_{B_s}

1.Select the observable or the parameter to scan

✖ Cancel Analysis ✔ Continue

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Documentation - EPS15

Standard Model > EPS15

Model | Scenario | Input

> $|V_{ud}|$

$|V_{ud}|$ is the $d \to u$ left-handed current coupling. It has been extracted using super-allowed nuclear β-decays, The PDG average is $0.97425 \pm 0 \pm 0.00022$.

> $|V_{us}| \times F_+^{K\pi}(0)$

$|V_{us}| \times F_+^{K\pi}(0)$ corresponds to the $s \to u$ left-handed current coupling. It has been extracted from semileptonic kaon decays ($K_{\ell 3}$). The PDG 2015 experimental data is 0.2163 ± 0.0005.

> $|V_{ub}|$

$|V_{ub}|$ is the $b \to u$ left-handed current coupling. It has been extracted from inclusive and exclusive semileptonic $b \to u$ transitions. The combination of experimental data with theoretical inputs on the relevant hadronic quantities leads to the CKMfitter average $(4.01 \pm 0.08 \pm 0.22) \times 10^{-3}$.

> $|V_{cb}|$

$|V_{cb}|$ is the $b \to c$ left-handed current coupling. It has been extracted from inclusive and exclusive semileptonic $b \to c$ transitions. The combination of experimental data with theoretical inputs on the relevant hadronic quantities leads to the CKMfitter average $(41.00 \pm 0.33 \pm 0.74) \times 10^{-3}$.

> $\Gamma(\Lambda_b \to p)/\Gamma(\Lambda_b \to \Lambda_c)$

$\Gamma(\Lambda_p \to p)/\Gamma(\Lambda_b \to \Lambda_c)$ is the ratio of semileptonic Λ_b decay rates measured by LHCb $(1.00 \pm 0.09) \times 10^{-2}$,

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Analysis - Target Input

Choose your target

Select the target(s), i.e., the quantity(ies) that you want to constrain through your analysis

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Target observable

$|V_{ub}|$
$|V_{cb}|$
α
$\sin 2\beta$
$\cos 2\beta$
γ
Δm_d
Δm_s

Target parameter

A
λ
$\bar{\rho}$
$\bar{\eta}$
R_t
$\frac{B_{B_s}}{B_{B_d}}$
f_{B_s}

A meaningful range for etabar can be between -5 and 5

Scan min of the first target (etabar)

0.3

Scan max of the first target (etabar)

0.4

2.Select the scan range

1.Select the observable or the parameter to scan

✖ Cancel Analysis ✔ Continue

3. Continue

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Analysis - Input Element

Choose your inputs

Select the inputs, i.e., the quantities that will be used to constrain your target

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Inputs

Recommended Global Fit

- $|V_{ud}|$
- $|V_{us}| \times F_+^{K\pi}(0)$
- $|V_{ub}|$
- $|V_{cb}|$
- α
- $\sin 2\beta$
- $\cos 2\beta$
- γ
- Δm_d
- Δm_s
- $|\epsilon_K|$
- $\alpha_S(m_Z)$
- $B(B \to \tau\nu)$
- $B(K \to e\nu)$
- $B(K \to \mu\nu)$
- $B(\tau \to K\nu)$
- $B_{K\mu 2}/B_{\pi\mu 2}$
- $B_{\tau K2}/B_{\tau\pi 2}$

Additional observables

- $2\beta_{sb}$

Your target choice

✔ $\bar{\eta}$ $[0.3, 0.4]$

1.Select the inputs of the fit (recommended global fit)

✖ Cancel Analysis ✔ Continue

2. Continue

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Analysis - Plotting

Parametrise the plotting

This step is not mandatory and it can be skipped clicking the green button "Skip plotting"

Skip plotting step

Plot : optional

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

CKM live By nickname

Please enter a nickname. This will appear on the plot as CKMlive by nickname

SDG

Please enter a title for the plot of the result

Global fit

1.Give a nickname and a title

Cancel Analysis Continue

2. Continue

CKM live

sedescot

- Home
- Your analyses
- Administration
- Legal information

Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

*** ETABAR-SDG**

Targets | Inputs | Plot

Your Target(s)

✔ $\bar{\eta}$ $[0.3, 0.4]$

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Your analysis properties

- ✔ Modify granularity 250

CKM live

sedescot

- Home
- Your analyses
- Administration
- Legal information

Analysis - List

success Your analysis [700] - "etabar-SDG" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
700	etabar-SDG	02/18/2019 - 06:22	$\bar{\eta}$	1	Prepared to be launched	EPS15		

1 The process is launched

From CKM Live Web <ckmliveweb@in2p3.fr>
Subject **incoming result analysis etabar-SDG.dat**
To Me <sebastien.descotes-genon@th.u-psud.fr>

Reply | Forward | Archive | Junk | Delete | More

06:51

```
Hello ,
The result for analysis etabar-SDG.dat (id#700) is now available. You can find it by selecting the
analysis in Your analyses/Ongoing analyses, clicking the green button to access the page "Personalise
your analysis" and selecting "Obtain the results".
The requested plot is coming soon, and you will receive an additional mail when it is available.

With our best regards,
CKMlive Web Server

_____

This is an automatic notification from http://ckmlive.in2p3.fr
Please DO NOT reply to this message.
Thanks
```

After a while, 2 mails, one for the data file, the other for the plot

From CKM Live Web <ckmliveweb@in2p3.fr>
Subject **incoming plot analysis 2019-02-18-plot-analysis-700.end.eps**
To Me <sebastien.descotes-genon@th.u-psud.fr>

Reply | Forward | Archive | Junk | Delete | More

06:58

```
Hello ,
The plot 2019-02-18-plot-analysis-700.end.eps for analysis id#700 is now available. You can find it by
selecting the analysis in Your analyses/Ongoing analyses, clicking the green button to access the page
"Personalise your analysis", and selecting the tab "Plot" to "See the eps plot"

Greetings,
CKMlive Web Server

_____

This is an automatic notification from http://ckmlive.in2p3.fr
Please DO NOT reply to this message.
Thanks
```

CKM live

sedescot

- Home
- Your analyses
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Analysis - List

In « Your analyses/Ongoing analyses »

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
700	etabar-SDG	02/18/2019 - 06:22	$\bar{\eta}$	1	Achieved	EPS15		
701	rhobaretabar-SDG	02/18/2019 - 06:39	$\bar{\rho}$ $\bar{\eta}$	2	Achieved	EPS15		
702	Vub-SDG	02/18/2019 - 06:49	$\|V_{ub}\|$	1	Transfered on the computing server	EPS15		
704	Vub-SDG-Indirect	02/18/2019 - 07:04	$\|V_{ub}\|$	1	Prepared to be launched	EPS15		

1

The process is achieved and the results can be retrieved

CKM live

sedescot

- Home
- Your analyses
- Administration
- Legal information

Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ ETABAR-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $\bar{\eta}$ $[0.3, 0.4]$

State

This analysis is achieved

Obtain the results

Choose the next step

✔ See datacard

✔ **Duplicate the analysis**

For the data file

Your analysis properties

✔ Modify granularity 250

```
//    analysisName -> "etabar-SDG"
//    theoryPackage -> {{"BBbarKKbarMixing`", version -> "SM"}, {"LeptonicDecay`",
version -> "SM"}, {"SemileptonicDecay`", version -> "SM"}, {"DiLeptonicDecay`",
version -> "SMNNLO"}, {"KtoPiNuNu`", version -> "SM"}}
//    inputData -> {}
//
//    analysisName -> "etabar-SDG"
//    takeMe -> {{"|Vud|", 0.97425, 0, 0.00022}, {"|Vus|xF+Kpi(0)", 0.2163, 0.0005},
{"|Vub|", 0.00398, 0.00008, 0.00022}, {"|Vcb|", 0.041, 0.00033, 0.00074}, {"alpha",
"Winter15/alpha_Winter15.dat"}, {"sin2beta", 0.691, 0.017}, {"cos2beta", 0.5, 0,
0.5}, {"gamma", "Summer14/gamma_CKM14.dat"}, {"Deltamd", 0.51, 0.003}, {"Deltams",
17.757, 0.021}, {"|epsilonK|", 0.0022280000000000004, 0.000011}, {"alphaS(mZ)",
0.1185, 0, 0.0006}, {"B(B->taunu)", 0.00010800000000000001, 0.000021}, {"B(K->enu)",
0.00001581, 8.*^-8}, {"B(K->munu)", 0.6355, 0.0011}, {"B(tau->Knu)", 0.006955,
0.000096}, {"Kmu2/pimu2", 1.3365, 0.0032}, {"tauK2/taupi2", 0.06431, 0.00094}, {"F
+Kpi(0)", 0.9645, 0.0015, 0.0045}, {"Bs", 1.32, 0.016, 0.03}, {"Bs/Bd", 1.023,
0.013, 0.014}, {"fBs", 0.224, 0.001, 0.002}, {"fBs/fBd", 1.205, 0.003, 0.006},
{"mtbar", 165.95, 0.35, 0.64}, {"etaB", 0.551, 0, 0.0022}, {"BK", 0.7615, 0.0027,
0.0137}, {"fK", 0.1552, 0.0002, 0.0006}, {"kappa_epsilonK", 0.94, 0.013, 0.023},
{"mcbar", 1.286, 0.013, 0.04}, {"etact", 0.497, 0, 0.047}, {"etatt", 0.5765, 0,
0.0065}, {"fK/fpi", 1.1952, 0.0007, 0.0029}, {"deltaKl2Rad", -0.007, 0, 0.0035},
{"deltatauK2Rad", 0.0073, 0, 0.0027}}
//    scenario -> "EPS15"
//    nickname -> "SDG"
//    title -> "Global fit"
//    plotQty -> {"#bar#eta"}
//    scanQty -> {"etabar"}
//    scanMin -> {0.3}
//    scanMax -> {0.4}
//    granularity -> 250
//    startRange -> {"A" -> {0.7, 0.9}, "lambda" -> {0.22, 0.23}, "rhobar" -> {-1.,
1.}, "etabar" -> {-1., 1.}, "LambdaQCD" -> {0.2, 0.24}}
//    verbose -> True
//    equivalence -> {}
//    plotMin -> {0.3}
//    plotMax -> {0.4}
//
//    alpha          Winter15/alpha_Winter15.dat LUT
//    gamma          Summer14/gamma_CKM14.dat    LUT
//    B(B->taunu)    0.00010800000000000001      0.000021 Gauss
//    B(K->enu)      0.00001581                  8.*^-8   Gauss
//    B(K->munu)     0.6355                      0.0011   Gauss
//    B(tau->Knu)    0.006955                    0.000096 Gauss
//    Kmu2/pimu2     1.3365                      0.0032   Gauss
//    sin2beta       0.691                       0.017    Gauss
//    |Vus|xF+Kpi(0) 0.2163                      0.0005   Gauss
//    Deltamd        0.51                        0.003    Gauss
//    Deltams        17.757                      0.021    Gauss
//    |epsilonK|     0.0022280000000000004       0.000011 Gauss
//    tauK2/taupi2   0.06431                     0.00094  Gauss
//    BK             0.7615                      0.0027   0.0137  GaussRange
//    Bs             1.32                        0.016    0.03    GaussRange
```

Information on analysis, parameters, observables, scan and plot

Value of the inputs

```
//    etaB            0.551                          0         0.0022  Range
//    etact           0.497                          0         0.047   Range
//    etatt           0.5765                         0         0.0065  Range
//    kappa_epsilonK 0.94                            0.013     0.023   GaussRange
//
//    global minimum Chi2 = 12.779 has been found at point
//    A -> 0.822673
//    lambda -> 0.225485
//    rhobar -> 0.150552
//    etaB -> 0.5525331276847826
//    fBs -> 0.226047
//    Bs -> 1.29235
//    fBs/fBd -> 1.21131
//    Bs/Bd -> 1.04116
//    fK -> 0.155818
//    BK -> 0.753141
//    delta1 -> 2.0801
//    etact -> 0.5398129335682634
//    etatt -> 0.5781333841352221
//    kappa_epsilonK -> 0.919654
//    mtbar -> 166.445
//    mcbar -> 1.30324
//    LambdaQCD -> 0.225059
//    fK/fpi -> 1.193
//    deltaKl2Rad -> -0.008414151344995836
//    deltatauK2Rad -> 0.00460001151867186
//    F+Kpi(0) -> 0.959764
//    etabar -> 0.3538
//
//    approximate pValue (from Prob) is 46.5 %
//
//    etabar = 0.3538 [+0.0069 -0.0067](1sigma)
//    etabar = 0.354 [+0.016 -0.018](2sigma)
//    etabar = 0.354 [+0.026 -0.027](3sigma)
//
//    TeX etabar & $0.3538^{+0.0069}_{-0.0067}$ & $0.354^{+0.016}_{-0.018}$ &
$0.354^{+0.026}_{-0.027}$ \\
//
//    Chi2Min = 12.779 is substracted
//
//    column format: xbin (ybin)  x  (y)  Chi2|1-p  p-value
//
//    end of header
134.983 0.353793 0.0007 0.978892
1 0.3002 45.814 1.30031E-11
2 0.3006 45.0176 1.95272E-11
3 0.301 44.2322 2.91644E-11
4 0.3014 43.4489 4.35176E-11
5 0.3018 42.6796 6.44813E-11
6 0.3022 41.9106 9.55433E-11
7 0.3026 41.1482 1.41113E-10
```

Global minimum and confidence intervals

p-value curve

CKM live

sedescot

- Home
- + Your analyses
- Administration
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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ ETABAR-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $\bar{\eta}$ $[0.3, 0.4]$

For the plot

State

This analysis is achieved

Obtain the results

Choose the next step

✔ See datacard

✔ **Duplicate the analysis**

Your analysis properties

✔ Modify granularity 250

CKM live

sedescot

- Home
- Your analyses
- Administration
- Legal information

Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

* ETABAR-SDG

Targets | Inputs | Plot

Your plot(s)

Nickname: SDG

Plot title: Gobal fit

Result:

- 2013-02-18-plot_analysis-700.end.eps

See the eps plot

For the plot

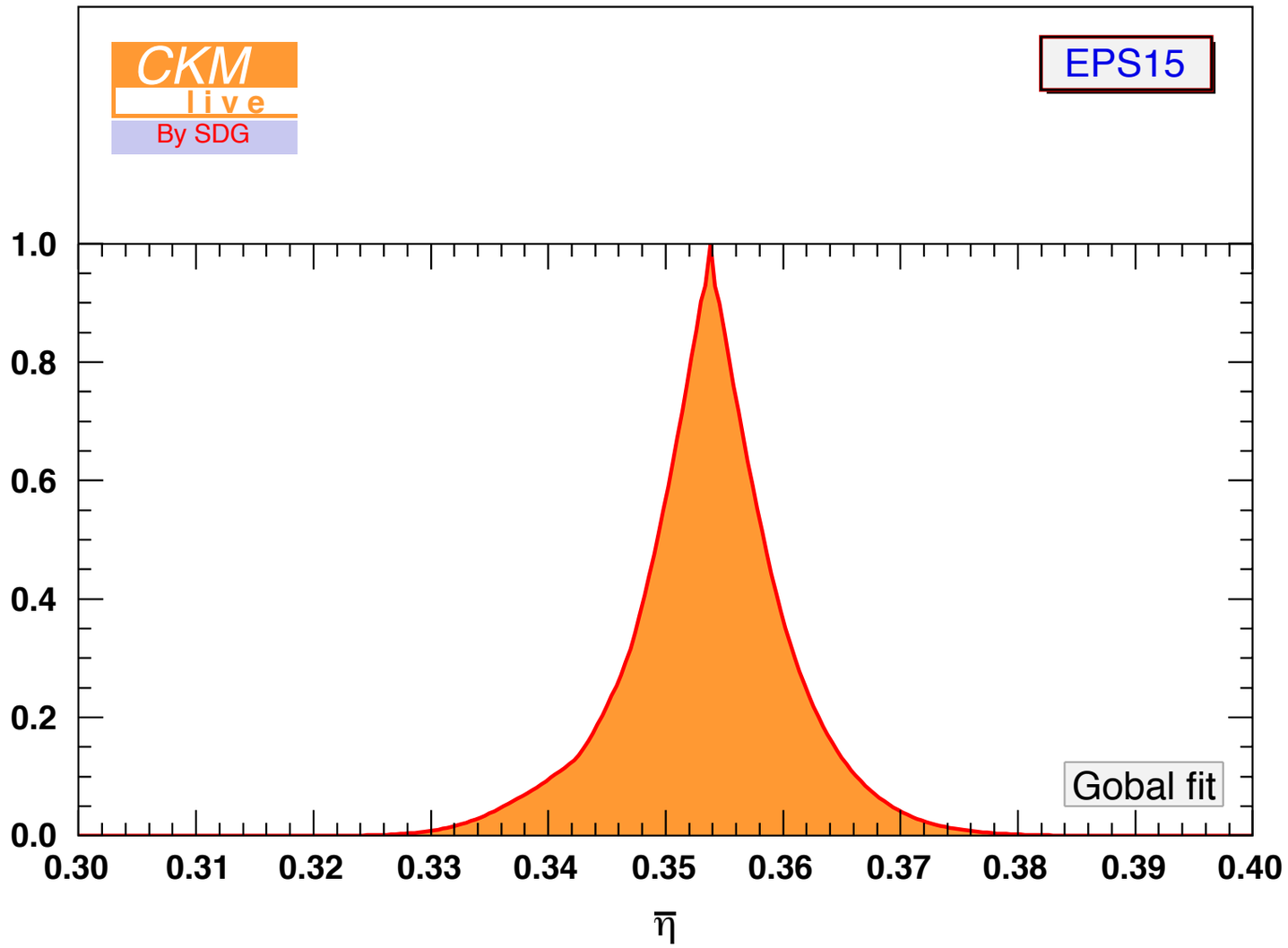
State

This analysis is achieved

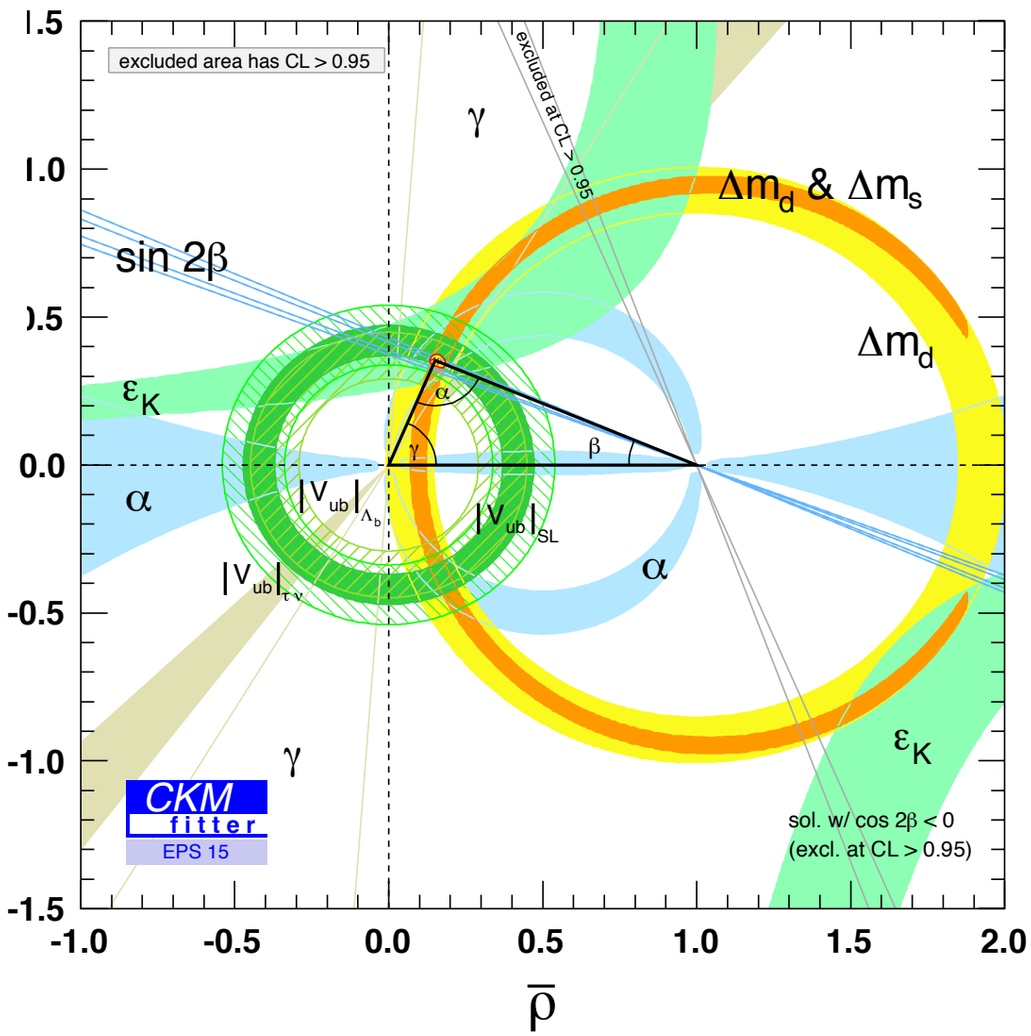
Obtain the results

Choose the next step

- ✔ See datacard
- ✔ Duplicate the analysis

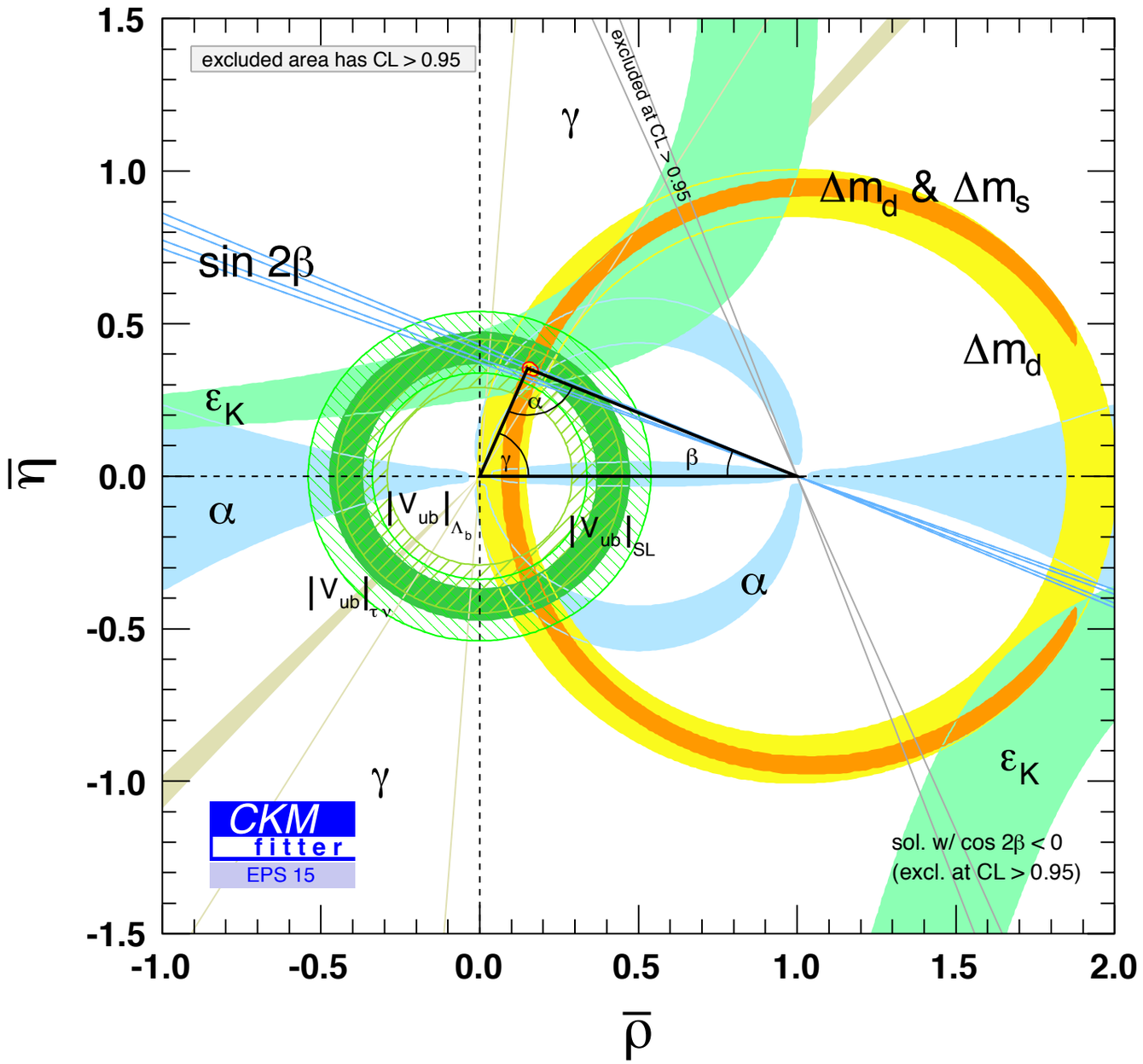


The value of the CKM parameter determined from the global fit



First exercise (alternative version)

First exercise (alternative version)



- Use the same data as the global fit for EPS15
- Perform the fit for $\bar{\eta}$ using only tree-level inputs
- Obtain the data file, the plot and confidence interval

CKM live

sedescot

- Home
- + Your analyses
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Analysis - Scenario & Scan constraint

Choose your scenario

Select the model and the scenario that will be the basis of your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

Name

etabar-SDG-tree

Scan constraint

1D

Model

Standard Model

Scenario

EPS15

✖ Cancel Analysis ✔ Continue

1.Fill the fields one after the other

2. Continue

CKM live

sedescot

- Home
- Your analyses
- Administration
- Legal information

Analysis - Target Input

Choose your target

Select the target(s), i.e., the quantity(ies) that you want to constrain through your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Info on params

Target observable

$|V_{ub}|$
$|V_{cb}|$
α
$\sin 2\beta$
$\cos 2\beta$
γ
Δm_d
Δm_s

Target parameter

A
λ
ρ
$\bar{\eta}$
B_{B_s}
$\frac{B_{B_s}}{B_{B_d}}$
f_{B_s}

A meaningful range for etabar can be between -5 and 5

Scan min of the first target (etabar)

0.2

Scan max of the first target (etabar)

0.5

1.Select the observable or the parameter to scan

✖ Cancel Analysis ✔ Continue

CKM live

sedescot

- Home
- + Your analyses
- Administration
- Legal information

Analysis - Input Element

Choose your inputs

Select the inputs, i.e., the quantities that will be used to constrain your target

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Inputs

Recommended Global Fit

- $|V_{ud}|$
- $|V_{us}| \times F_+^{K\pi}(0)$
- $|V_{ub}|$
- $|V_{cb}|$
- α
- $\sin 2\beta$
- $\cos 2\beta$
- γ
- Δm_d
- Δm_s
- $|\epsilon_K|$
- $\alpha_S(m_Z)$
- $B(B \to \tau\nu)$
- $B(K \to e\nu)$
- $B(K \to \mu\nu)$
- $B(\tau \to K\nu)$
- $B_{K\mu 2}/B_{\pi\mu 2}$
- $B_{\tau K2}/B_{\tau\pi 2}$

Additional observables

- $2\beta_{sb}$

Your target choice

✔ $\bar{\eta}$ [0.2 , 0.5]

1.Select the inputs of the fit (tree observables from recommended global fit)

✖ Cancel Analysi ✔ Continue

2. Continue

CKM live

sedescot

- Home
- + Your analyses
- Administration
- Legal information

Analysis - Plotting

Parametrise the plotting

This step is not mandatory and it can be skipped clicking the green button "Skip plotting"

Skip plotting step

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

CKM live
By nickname

Please enter a nickname. This will appear on the plot as CKMlive by nickname

SDG

Please enter a title for the plot of the result

Tree only

1.Give a nickname and a title

Cancel Analysis Continue

2. Continue

CKM live

sedescot

Home

Your analyses

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ ETABAR-SDG-TREE

Targets | Inputs | Plot

Your Target(s)

✔ $\bar{\eta}$ $[0.2, 0.5]$

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Your analysis properties

✔ Modify granularity 250

CKM live

sedescot

- Home
- Your analyses
- Administration
- Legal information

Analysis - List

success Your analysis [809] - "etabar-SDG-tree" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
803	etabar-SDG	02/22/2019 - 05:58	$\bar{\eta}$	1	Achieved	EPS15		
809	etabar-SDG-tree	02/22/2019 - 07:18	$\bar{\eta}$	1	Prepared to be launched	EPS15		

The process is launched

1

CKM live

sedescot

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- Your analyses
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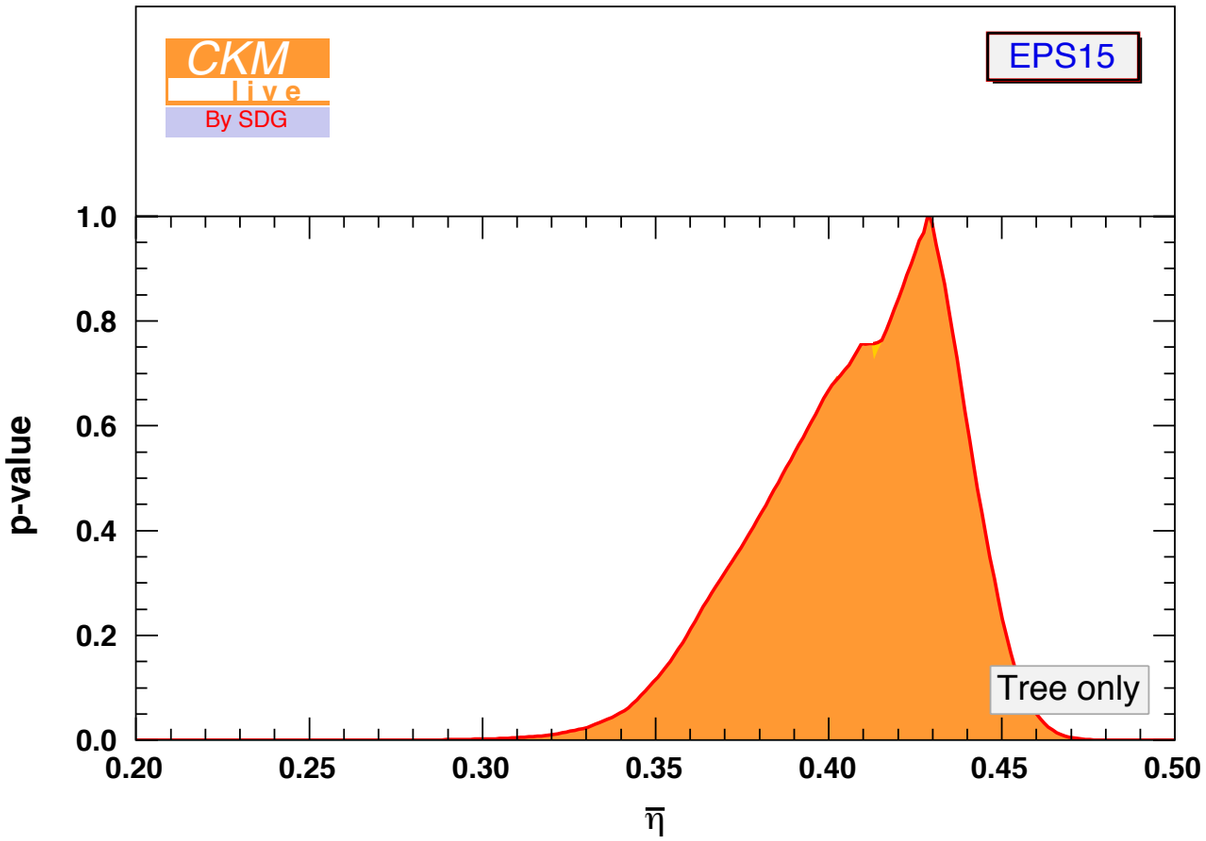
Analysis - List

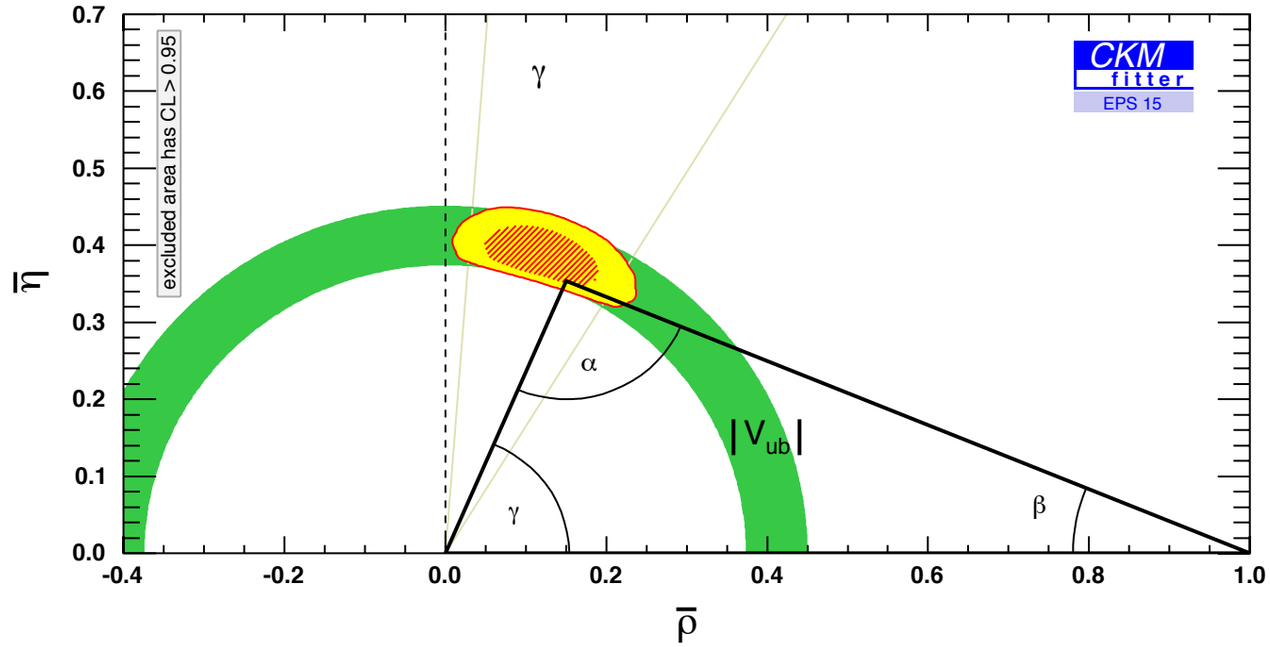
Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
803	etabar-SDG	02/22/2019 - 05:58	$\bar{\eta}$	1	Achieved	EPS15		
809	etabar-SDG-tree	02/22/2019 - 07:18	$\bar{\eta}$	1	Achieved	EPS15		

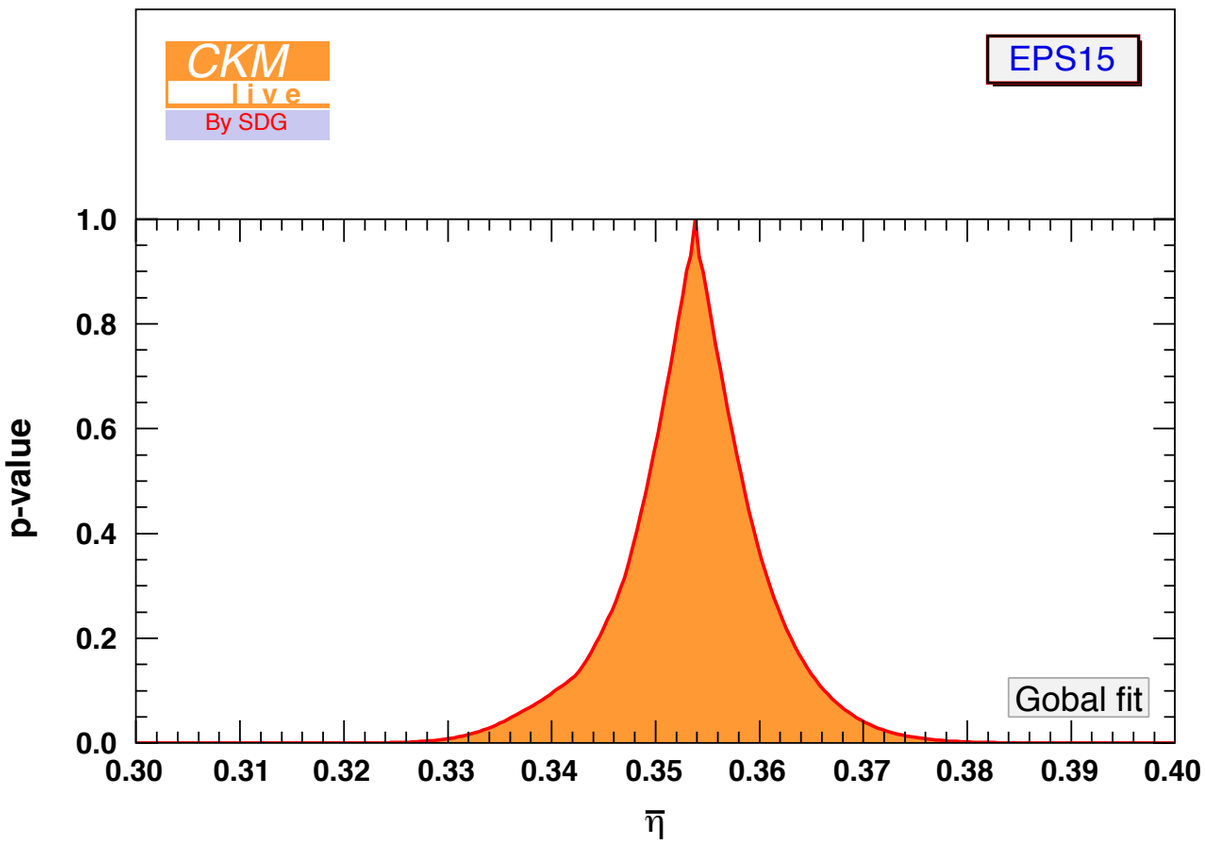
1

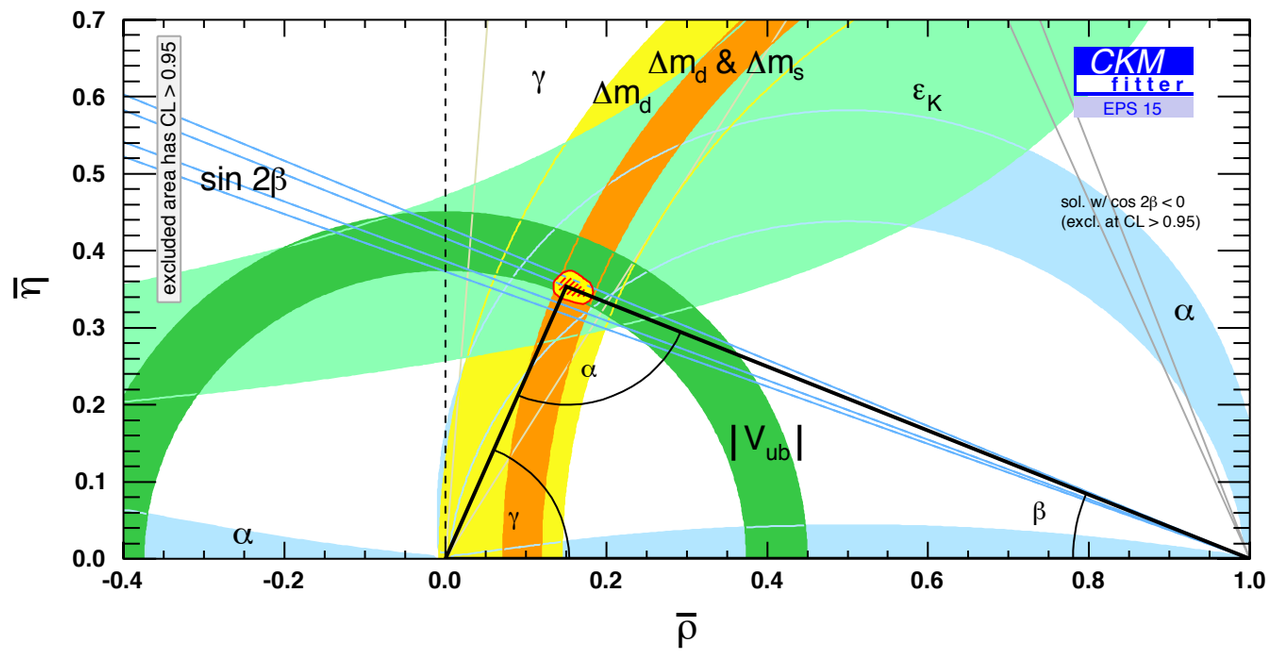
When you get the mails telling you that the process is achieved, the results can be retrieved





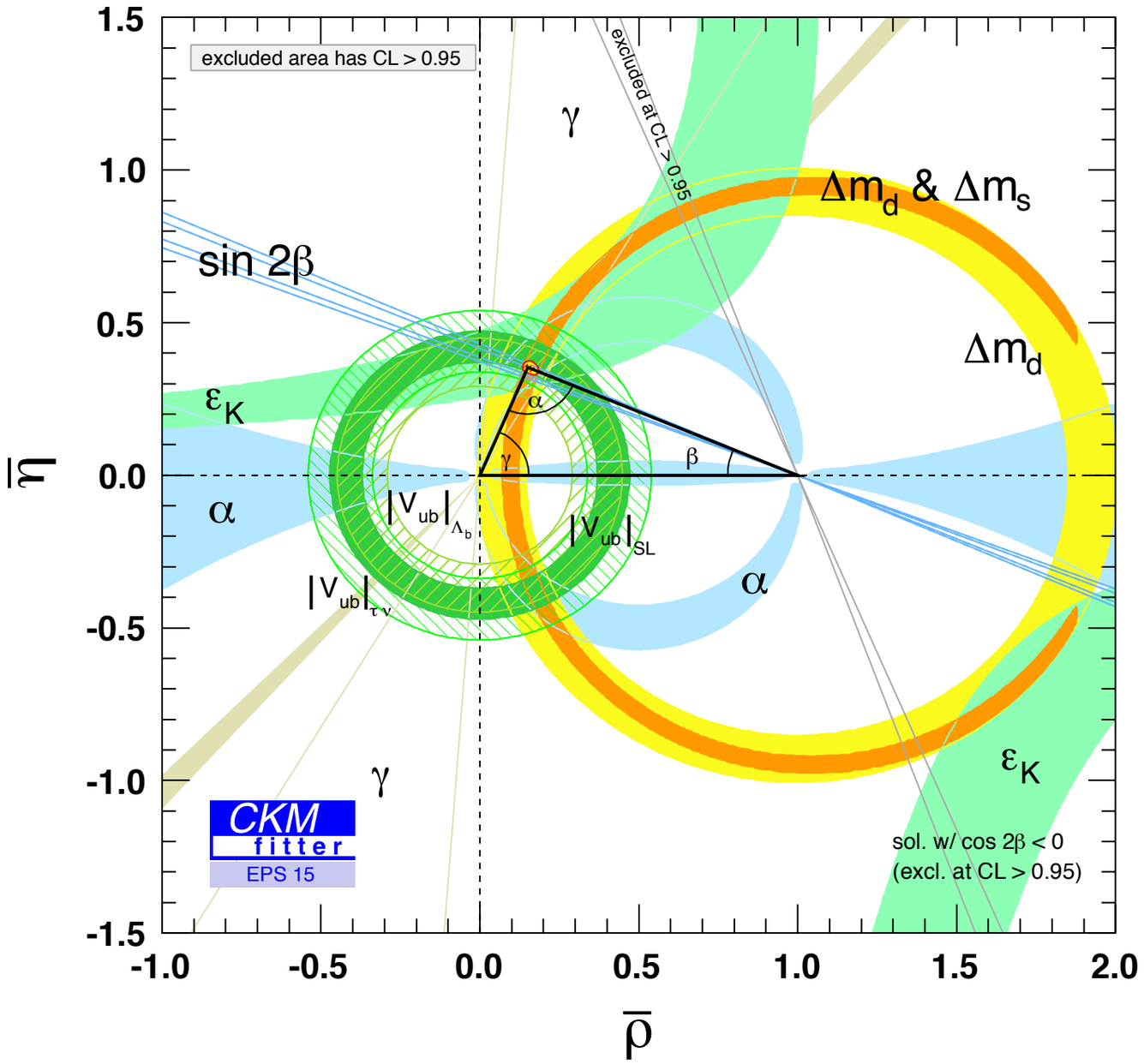
Tree versus Global





Second exercise

Second exercise



- Use the same data as the global fit for EPS15
- Perform the fit for $(\bar{\rho}, \bar{\eta})$
- Obtain the data file and the plot

CKM live

sedescot

- Home
- Your analyses
- Administration
- Legal information

Analysis - Scenario & Scan constraint

Choose your scenario

Select the model and the scenario that will be the basis of your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

Name

rhobaretabar-SDG

Scan constraint

2D

Model

Standard Model

Scenario

EPS15

✖ Cancel Analysis ✔ Continue

2. Continue

1.Fill the fields one after the other

Home

Your analyses

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Analysis - Target Input

Choose your target

Select the target(s), i.e., the quantity(ies) that you want to constrain through your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

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You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Target observable

$|V_{ud}|$
$|V_{us}| \times F_+^{K\pi}(0)$
$|V_{ub}|$
$|V_{cb}|$
α
$\sin 2\beta$
$\cos 2\beta$

Target parameter

A
$\bar{\rho}$
$\bar{\eta}$
$\frac{B_{B_s}}{B_{B_d}}$
f_{B_s}

1.Select the observable or the parameter to scan

✖ Cancel Analysis ✔ Continue

3. Continue

A meaningful range for rhobar can be between -5 and 5

Scan min of the first target (rhobar)

-0.4

Scan max of the first target (rhobar)

1.0

A meaningful range for etabar can be between -5 and 5

Scan min of the second target (etabar)

0

Scan max of the second target (etabar)

0.7

Which target as abscissa ?

First Second

2.Select the scan ranges and the abscissa

CKM live

sedescot

- Home
- Your analyses
- Administration
- Legal information

Analysis - Input Element

Choose your inputs

Select the inputs, i.e., the quantities that will be used to constrain your target

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the “Back” feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Inputs

Recommended Global Fit

- $|V_{ud}|$
- $|V_{us}| \times F_+^{K\pi}(0)$
- $|V_{ub}|$
- $|V_{cb}|$
- α
- $\sin 2\beta$
- $\cos 2\beta$
- γ
- Δm_d
- Δm_s
- $|\epsilon_K|$
- $\alpha_S(m_Z)$
- $B(B \to \tau\nu)$
- $B(K \to e\nu)$
- $B(K \to \mu\nu)$
- $B(\tau \to K\nu)$
- $B_{K\mu 2}/B_{\pi\mu 2}$
- $B_{\tau K2}/B_{\tau\pi 2}$

Additional observables

- $2\beta_{sb}$

Your target choice

✔ $\bar{\rho}$	$[-0.4, 1]$
✔ $\bar{\eta}$	$[0, 0.7]$

1.Select the inputs of the fit (recommended global fit)

✖ Cancel Analysis ✔ Continue

2. Continue

CKM live

sedescot

Home

Your analyses

Administration

Legal information

Analysis - Plotting

Parametrise the plotting

This step is not mandatory and it can be skipped clicking the green button "Skip plotting"

Skip plotting step

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

CKM live By nickname

Please enter a nickname. This will appear on the plot as CKMlive by nickname

SDG

Please enter a title for the plot of the result

Global fit

Cancel Analysis

Continue

1.Give a nickname and a title

2. Continue

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ RHOBARETABAR-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $\bar{\rho}$	$[-0.4, 1]$
✔ $\bar{\eta}$	$[0, 0.7]$

Possibility to have more information or to customise the analysis

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Your analysis properties

- ✔ Modify granularity 250

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ **RHOBARETABAR-SDG**

Targets | Inputs | Plot

Show parameter dependence of obs

Your input observable(s)

observable	Value	Documentation	Actions
$\|V_{ud}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ud}\|$			Show parameters...
$\|V_{us}\| \times F_+^{K\pi}(0)$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{us}\| \times F_+^{K\pi}(0)$			Show parameters...
$\|V_{ub}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ub}\|$			Show parameters...
$\|V_{cb}\|$	EPS15	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Your analysis properties

- ✔ Modify granularity 250

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ RHOBARETABAR-SDG

Show simple analysis datacard

Targets | Inputs | Plot

Your input observable(s)

observable	Value	Documentation	Actions
$\|V_{ud}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ud}\|$			Show parameters...
$\|V_{us}\| \times F_+^{K\pi}(0)$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{us}\| \times F_+^{K\pi}(0)$			Show parameters...
$\bar{\rho}$	none	Quantity documentation	See $\bar{\rho}$ of $\|V_{ud}\|$
$\bar{\eta}$	none	Quantity documentation	See $\bar{\eta}$ of $\|V_{ud}\|$
A	none	Quantity documentation	See A of $\|V_{ud}\|$
λ	none	Quantity documentation	See λ of $\|V_{ud}\|$
$F_+^{K\pi}(0)$	EPS15	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ Abort
- ✔ Submit

Your analysis properties

- ✔ Modify granularity 250

CKM live

sedescot

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Analysis - Datacard

Information similar to data file obtained after the fit


```
{
"rhobaretabar-SDG",

"Standard Model",

{  },

{"|Vud|","EPS15"},

{"All(|Vus|xF+Kpi(0))","|Vus|xF+Kpi(0)","F+Kpi(0)"},
{"|Vus|xF+Kpi(0)","EPS15"},

{"|Vub|","EPS15"},

{"|Vcb|","EPS15"},

{"alpha","EPS15"},

{"sin2beta","EPS15"},

{"cos2beta","EPS15"},

{"gamma","EPS15"},

{"All(Deltamd)","Deltamd","Bs","Bs/Bd","fBs","fBs/fBd","mtbar","etaB"},
{"Deltamd","EPS15"},

{"All(Deltams)","Deltams","Bs","fBs","mtbar","etaB"},
{"Deltams","EPS15"},

{"All(|epsilonK|)","|epsilonK|","mtbar","BK","fK","kappa_epsilonK","mcbar",'
etact","etatt","LambdaQCD"},
{"|epsilonK|","EPS15"},
```


Current analysis

✔ return to analysis definition go

Inputs and their value

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Analysis - Datacard


```
{
"rhobaretabar-SDG",

"Standard Model",

{  },

{"|Vud|","EPS15"},

{"All(|Vus|xF+Kpi(0))","|Vus|xF+Kpi(0)","F+Kpi(0)"},
{"|Vus|xF+Kpi(0)","EPS15"},

{"|Vub|","EPS15"},

{"|Vcb|","EPS15"},

{"alpha","EPS15"},

{"sin2beta","EPS15"},

{"cos2beta","EPS15"},

{"gamma","EPS15"},

{"All(Deltamd)","Deltamd","Bs","Bs/Bd","fBs","fBs/fBd","mtbar","etaB"},
{"Deltamd","EPS15"},

{"All(Deltams)","Deltams","Bs","fBs","mtbar","etaB"},
{"Deltams","EPS15"},

{"All(|epsilonK|)","|epsilonK|","mtbar","BK","fK","kappa_epsilonK","mcbar","
etact","etatt","LambdaQCD"},
{"|epsilonK|","EPS15"},
```


Current analysis

return to analysis definition go

Home

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ RHOBARETABAR-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $\bar{\rho}$	$[-0.4, 1]$
✔ $\bar{\eta}$	$[0, 0.7]$

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ Abort
- ✔ Submit

Your analysis properties

- ✔ Modify granularity 250

CKM live

sedescot

- Home
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Analysis - List

success Your analysis [701] - "rhobaretabar-SDG" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
700	etabar-SDG	02/18/2019 - 06:22	$\bar{\eta}$	1	Transfered on the computing server	EPS15		
701	rhobaretabar-SDG	02/18/2019 - 06:39	$\bar{\rho}$ $\bar{\eta}$	2	Prepared to be launched	EPS15		

1

After a while, 2 mails,
one for the data file,
the other for the plot

Home

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Analysis - List

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
700	etabar-SDG	02/18/2019 - 06:22	$\bar{\eta}$	1	Achieved	EPS15		
701	rhobaretabar-SDG	02/18/2019 - 06:39	$\bar{\rho}$ $\bar{\eta}$	2	Achieved	EPS15		
702	Vub-SDG	02/18/2019 - 06:49	$\|V_{ub}\|$	1	Transfered on the computing server	EPS15		
704	Vub-SDG-Indirect	02/18/2019 - 07:04	$\|V_{ub}\|$	1	Prepared to be launched	EPS15		

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ RHOBARETABAR-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $\bar{\rho}$	$[-0.4, 1]$
✔ $\bar{\eta}$	$[0, 0.7]$

State

This analysis is achieved

Obtain the results

Choose the next step

- ✔ See datacard
- ✔ **Duplicate the analysis**

Your analysis properties

- ✔ Modify granularity 250

Data file obtained as before

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

* RHOBARETABAR-SDG

Targets | Inputs | Plot

Your plot(s)

Nickname: SDG

Plot title: Global fit

Result:

- 2019-02-18-plot-analysis-701.end.eps

See the eps plot

State

This analysis is achieved

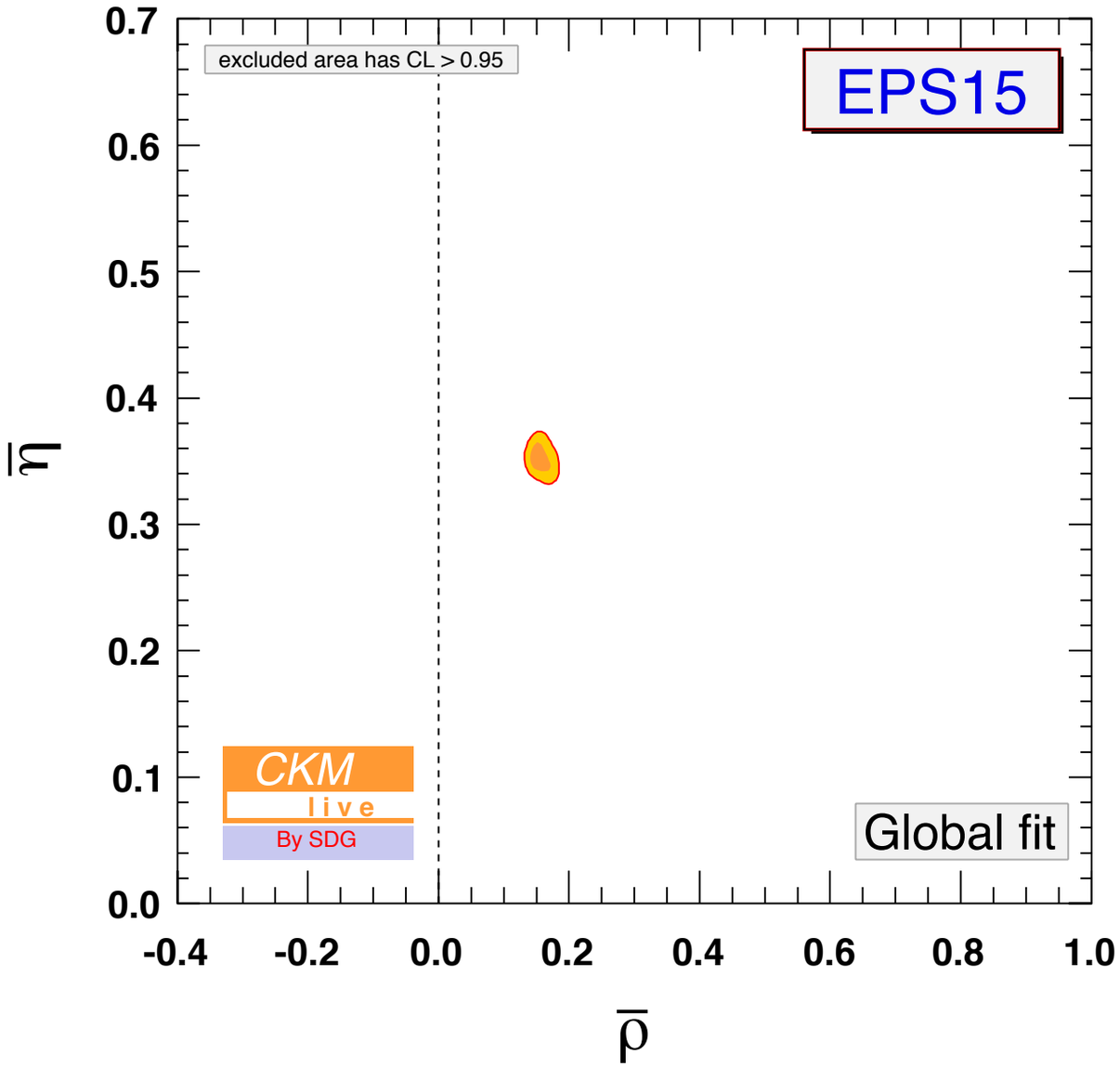
Obtain the results

Choose the next step

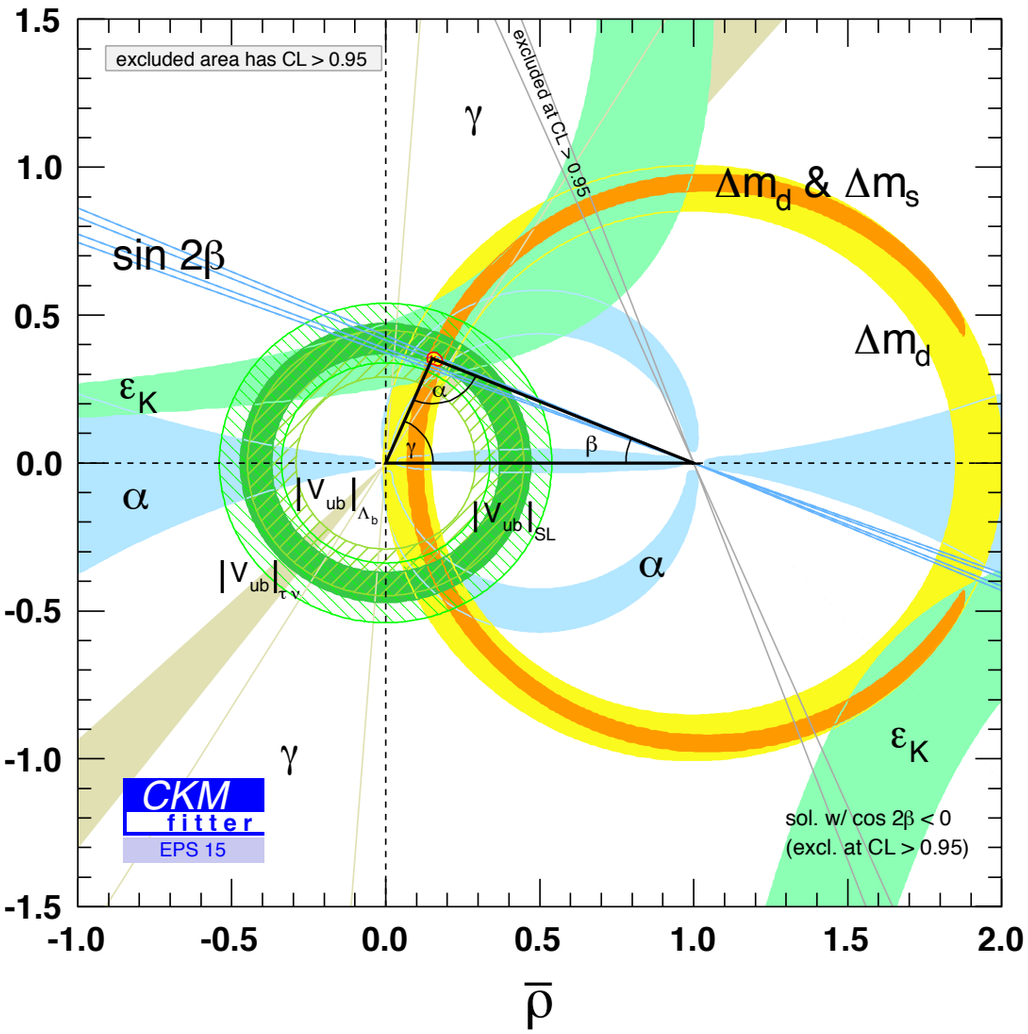
✔ See datacard

✔ **Duplicate the analysis**

Plot file obtained as before

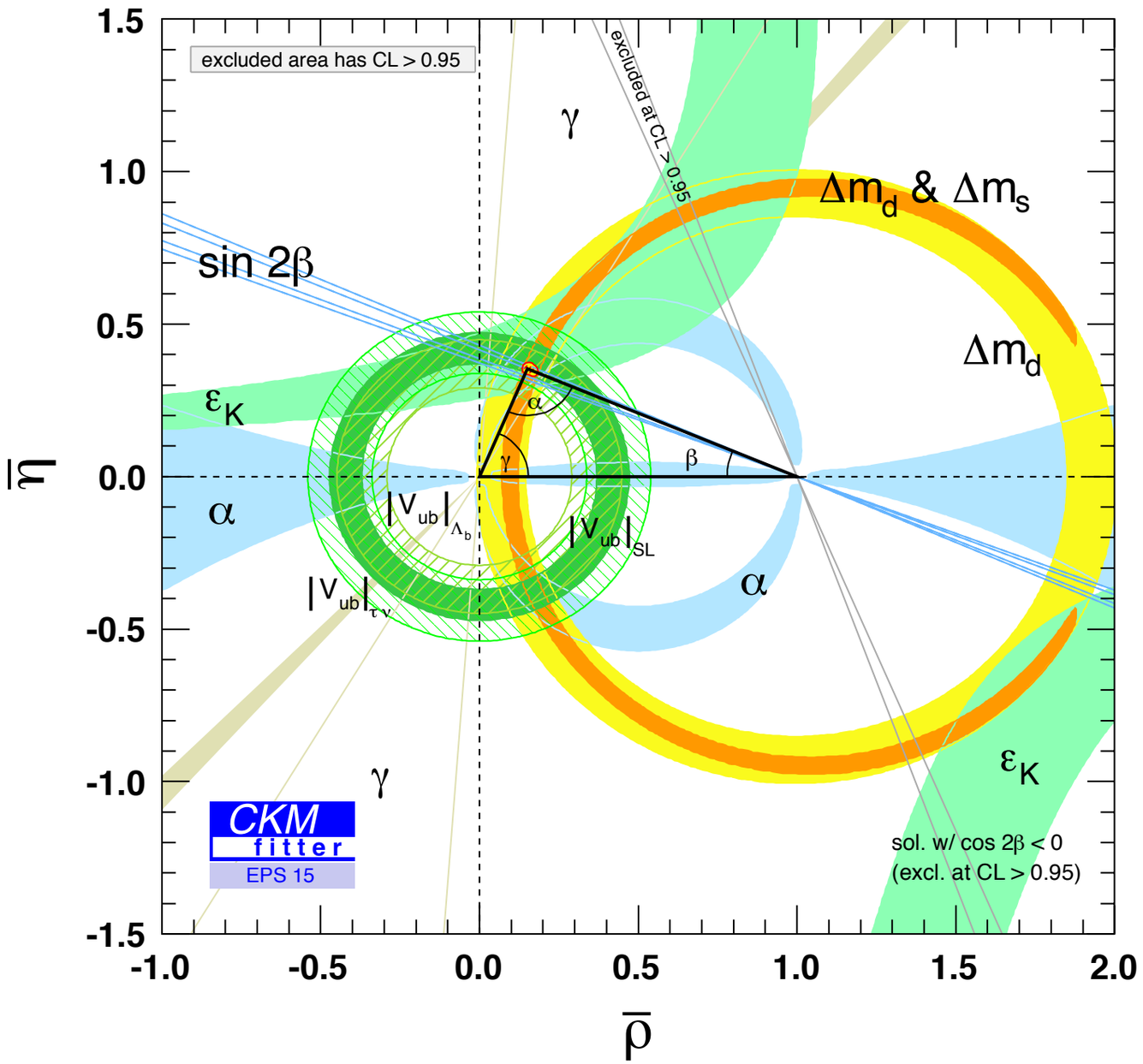


The plots with the different (individual constraints) are obtained by drawing the 2D constraints for subset of observables



Third exercise

Third exercise



- Use the same data as the global fit for EPS15
- Perform the fit for $|V_{cb}|$ with different inputs
  - Global: all inputs
  - Indirect: all inputs but no input on $|V_{cb}|$ from semileptonic decays
  - Exclusive: all inputs, with input for $|V_{cb}|$ from exclusive semileptonic decays
  - Inclusive: all inputs, with input for $|V_{cb}|$ from inclusive semileptonic decays
- Compare the plots

Third exercise

Fits on $|V_{cb}|$

- Global: all inputs of the global fit
- Indirect: all inputs but no input on $|V_{cb}|$ from semileptonic decays
- Exclusive: all inputs, with input for $|V_{cb}|$ from exclusive semileptonic decays
- Inclusive: all inputs, with input for $|V_{cb}|$ from inclusive semileptonic decays

CKM live

sedescot

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Analysis - Scenario & Scan constraint

Choose your scenario

Select the model and the scenario that will be the basis of your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the “Back” feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

Name

Vcb-SDG

Scan constraint

1D

Model

Standard Model

Scenario

EPS15

✖ Cancel Analysis ✔ Continue

Global fit for Vcb

Analysis - Target Input

Choose your target

Select the target(s), i.e., the quantity(ies) that you want to constrain through your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Target observable

$|V_{ud}|$
$|V_{us}| \times F_{+}^{K\pi}(0)$
$|V_{ub}|$
$|V_{cb}|$
α
$\sin 2\beta$
$\cos 2\beta$

A meaningful range for |Vcb| can be between 0.01 and 0.1

Scan min of the first target (|Vcb|)

0.04

Scan max of the first target (|Vcb|)

0.045

Target parameter

A
λ
$\bar{\rho}$
$\bar{\eta}$
B_s
$\frac{B_{B_s}}{B_{B_d}}$
f_{B_s}

✖ Cancel Analysis ✔ Continue

Analysis - Input Element

Choose your inputs

Select the inputs, i.e., the quantities that will be used to constrain your target

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Inputs

Recommended Global Fit

- $|V_{ud}|$
- $|V_{us}| \times F_{+}^{K\pi}(0)$
- $|V_{ub}|$
- $|V_{cb}|$
- α
- $\sin 2\beta$
- $\cos 2\beta$
- γ
- Δm_d
- Δm_s
- $|\epsilon_K|$
- $\alpha_S(m_Z)$
- $B(B \to \tau\nu)$
- $B(K \to e\nu)$
- $B(K \to \mu\nu)$
- $B(\tau \to K\nu)$
- $B_{K\mu 2}/B_{\pi\mu 2}$
- $B_{\tau K2}/B_{\tau\pi 2}$

Additional observables

- $2\beta_{sb}$

Your target choice

✔ $|V_{cb}|$ [0.04 , 0.045]

✖ Cancel Analysis ✔ Continue

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Analysis - Plotting

Parametrise the plotting

This step is not mandatory and it can be skipped clicking the green button "Skip plotting"

Skip plotting step

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

CKM live
By nickname

Please enter a nickname. This will appear on the plot as CKMlive by nickname

SDG

Please enter a title for the plot of the result

Global

Cancel Analysis Continue

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notic...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for t...

Additional information as the target is also an input as can be checked in the « Inputs » tab

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG

Targets | Inputs | Plot

Your input observable(s)

observable	value	Documentation	Actions
$\|V_{cb}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{cb}\|$			Show parameters...
$\|V_{ud}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ud}\|$			Show parameters...
$\|V_{us}\| \times F_+^{K\pi}(0)$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{us}\| \times F_+^{K\pi}(0)$			Show parameters...
$\|V_{ub}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ub}\|$			Show parameters...

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ Abort
- ✔ Submit

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

Input for the target from EPS15

CKM live

sedescot

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Analysis - List

success Your analysis [767] - "Vcb-SDG" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Prepared to be launched	EPS15		

1

Third exercise

Fits on $|V_{cb}|$

- Global: all inputs of the global fit
- Indirect: all inputs but no input on $|V_{cb}|$ from semileptonic decays
- Exclusive: all inputs, with input for $|V_{cb}|$ from exclusive semileptonic decays
- Inclusive: all inputs, with input for $|V_{cb}|$ from inclusive semileptonic decays

CKM live

sedescot

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Analysis - List

success Your analysis [767] - "Vcb-SDG" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Prepared to be launched	EPS15		

1

We could start from scratch,
but easier to use
the « Copy/Duplicate »
feature of CKMlive

Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

State

This analysis is achieved

Obtain the results

Choose the next step

✔ See datacard

Duplicate the analysis

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

Personalise your analysis

success Your analysis [767] has been copied in a new analysis [769]. Please go to Your analysis/Ongoing analyses in order to edit the copy.

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

State

This analysis is achieved

Obtain the results

Choose the next step

✔ See datacard

✔ **Duplicate the analysis**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

CKM live

sedescot

- Home
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Analysis - List

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Achieved	EPS15		
769	Vcb-SDG _copy_	02/18/2019 - 20:39	$\|V_{cb}\|$	1	Analysis under construction	EPS1		

1

There is _copy_ of
the previous analysis,
still under construction

CKM live

sedescot

- Home
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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG _COPY_

We can rename it

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

CKM live

sedescot

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Analysis - Define Analysis name

Analysis name

Name

Vcb-SDG-indirect

Envoyer

This will be the indirect determination of Vcb
coming from the global fit
without any input from semileptonic decays

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INDIRECT

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a ta…t for which an input va… is given a… will be included in the fit

Ignore the input value for the fit

We must remove the input from Vcb, which comes from semileptonic decays

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INDIRECT

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notic…

$|V_{cb}|$ is a target for which an input value is given and will be ignored in the fit

Include the input value for th…

The input from Vcb is now removed
Before submitting
we have to give the details for the plot

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INDIRECT

Targets | Inputs | Plot

Your plot(s)

There is no plot defined for this analysis

Define a plot for this analysis

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be ignored in the fit

Include the input value for the fit

CKM live

sedescot

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Analysis - Plotting

Parametrise the plotting

This step is not mandatory and it can be skipped clicking the green button "Skip plotting"

Skip plotting step

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

CKM live

By nickname

Please enter a nickname. This will appear on the plot as CKMlive by nickname

SDG

Please enter a title for the plot of the result

Indirect

Cancel Analysis | Continue

indirect
determination of Vcb

CKM live

sedescot

- Home
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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INDIRECT

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be ignored in the fit

Include the input value for the fit

Once the inputs and the plot are fixed, we can submit

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Analysis - List

success Your analysis [769] - "Vcb-SDG-Indirect" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Achieved	EPS15		
769	Vcb-SDG-Indirect	02/18/2019 - 20:39	$\|V_{cb}\|$	1	Prepared to be launched	EPS15		

Third exercise

Fits on $|V_{cb}|$

- Global: all inputs of the global fit
- Indirect: all inputs but no input on $|V_{cb}|$ from semileptonic decays
- Exclusive: all inputs, with input for $|V_{cb}|$ from exclusive semileptonic decays
- Inclusive: all inputs, with input for $|V_{cb}|$ from inclusive semileptonic decays

CKM live

sedescot

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Analysis - List

success Your analysis [769] - "Vcb-SDG-Indirect" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Achieved	EPS15		
769	Vcb-SDG-Indirect	02/18/2019 - 20:39	$\|V_{cb}\|$	1	Prepared to be launched	EPS15		

1

We can use again
the « Copy/Duplicate » feature of CKMlive
starting from the initial analysis
and changing the input from Vcb

Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

State

This analysis is achieved

Obtain the results

Choose the next step

✔ See datacard

Duplicate the analysis

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

Personalise your analysis

success Your analysis [767] has been copied in a new analysis [770]. Please go to Your analysis/Ongoing analyses in order to edit the copy.

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

State

This analysis is achieved

Obtain the results

Choose the next step

✔ See datacard

✔ **Duplicate the analysis**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

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Analysis - List

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Achieved	EPS15		
769	Vcb-SDG-Indirect	02/18/2019 - 20:39	$\|V_{cb}\|$	1	Transfered on the computing server	EPS15		
770	Vcb-SDG _copy_	02/18/2019 - 20:52	$\|V_{cb}\|$	1	Analysis under construction	EPS15		

1

There is _copy_ of
the previous analysis,
still under construction

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG _COPY_

We can rename it

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

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Analysis - Define Analysis name

Analysis name

Name

Vcb-SDG-exclusive

Envoyer

This will be the determination of Vcb
coming from the global fit
without input from exclusive semileptonic decays

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-EXCLUSIVE

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

We must change the input from Vcb, only from exclusive semileptonic decays

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-EXCLUSIVE

Targets | Inputs | Plot

We can change the input from Vcb

Your input observable(s)

observable	Value	Documentation	Actions
$\|V_{cb}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{cb}\|$			Show parameters...
$\|V_{ud}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ud}\|$			Show parameters...
$\|V_{us}\| \times F_+^{K\pi}(0)$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{us}\| \times F_+^{K\pi}(0)$			Show parameters...
$\|V_{ub}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ub}\|$			Show parameters...

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

CKM live

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Setting the value of a observable

Edit observable $|V_{cb}|$

In this interface, you can change the properties of your input.
You have two possibilities

- on the left, you can take the input from a reference CKMfitter analysis, either the default value of the datacard **EPS15** for $|V_{cb}|$ or a value from a different scenario
- on the right, you can set your own values (central value, experimental and theoretical value). The central value must be within the range indicated in brackets.

Information for $|V_{cb}|$ can be found on the scenario **EPS15**

Change reference...

Define Reference for the Input

EPS15

Envoyer

2. Continue

... or give your own values (Range for central value [0.01, 0.1])

Notice : you must change the three values at once

Name

|Vcb|

Central value

0.03899

Experimental uncertainty

0.00049

Theoretical uncertainty

0.00117

Envoyer

1. Give the input values

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-EXCLUSIVE

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

We can check that our value is taken into account

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-EXCLUSIVE

Targets | Inputs | Plot

Your input observable(s)

observable	value	Documentation	Actions
$\|V_{cb}\|$	0.03899 ± 0.00049 ± 0.00117	uantity documentation	
✚ Parameters of the observable $\|V_{cb}\|$			Show parameters...
$\|V_{ud}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ud}\|$			Show parameters...
$\|V_{us}\| \times F_+^{K\pi}(0)$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{us}\| \times F_+^{K\pi}(0)$			Show parameters...
$\|V_{ub}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ub}\|$			Show parameters...

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

The input from Vcb is now changed

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-EXCLUSIVE

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

Before submitting
we have to give the details for the plot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-EXCLUSIVE

Targets | Inputs | Plot

Your plot(s)

There is no plot defined for this analysis

Define a plot for this analysis

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

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Analysis - Plotting

Parametrise the plotting

This step is not mandatory and it can be skipped clicking the green button "Skip plotting"

Skip plotting step

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

CKM live

By nickname

Please enter a nickname. This will appear on the plot as CKMlive by nickname

SDG

Please enter a title for the plot of the result

Exclusive

Cancel Analysis | Continue

determination of Vcb based on exclusive semileptonic decays

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-EXCLUSIVE

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Once the inputs and the plot are fixed, we can submit

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ Abort
- ✔ Submit

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

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Analysis - List

success Your analysis [770] - "Vcb-SDG-exclusive" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Achieved	EPS15		
769	Vcb-SDG-Indirect	02/18/2019 - 20:39	$\|V_{cb}\|$	1	Achieved	EPS15		
770	Vcb-SDG-exclusive	02/18/2019 - 20:52	$\|V_{cb}\|$	1	Prepared to be launched	EPS15		

Third exercise

Fits on $|V_{cb}|$

- Global: all inputs of the global fit
- Indirect: all inputs but no input on $|V_{cb}|$ from semileptonic decays
- Exclusive: all inputs, with input for $|V_{cb}|$ from exclusive semileptonic decays
- Inclusive: all inputs, with input for $|V_{cb}|$ from inclusive semileptonic decays

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Analysis - List

success Your analysis [770] - "Vcb-SDG-exclusive" has been submitted. You will soon receive an email notification informing you of the end of its execution.

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Achieved	EPS15		
769	Vcb-SDG-Indirect	02/18/2019 - 20:39	$\|V_{cb}\|$	1	Achieved	EPS15		
770	Vcb-SDG-exclusive	02/18/2019 - 20:52	$\|V_{cb}\|$	1	Prepared to be launched	EPS15		

1

We can use again
the « Copy/Duplicate » feature of CKMlive
starting from the initial analysis
and changing the input from Vcb

Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

State

This analysis is achieved

Obtain the results

Choose the next step

✔ See datacard

Duplicate the analysis

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

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Personalise your analysis

success Your analysis [767] has been copied in a new analysis [771]. Please go to Your analysis/Ongoing analyses in order to edit the copy.

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

State

This analysis is achieved

Obtain the results

Choose the next step

✔ See datacard

✔ **Duplicate the analysis**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

CKM live

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Analysis - List

Your Analysis

Analysis	Name	Date	Element target	scan constraint	status	Scenario	Edit	Remove
767	Vcb-SDG	02/18/2019 - 19:47	$\|V_{cb}\|$	1	Achieved	EPS15		
769	Vcb-SDG-Indirect	02/18/2019 - 20:39	$\|V_{cb}\|$	1	Achieved	EPS15		
770	Vcb-SDG-exclusive	02/18/2019 - 20:52	$\|V_{cb}\|$	1	Transfered on the computing server	EPS15		
771	Vcb-SDG _copy	02/18/2019 - 21:18	$\|V_{cb}\|$	1	Analysis under construction	EPS15		

1

There is _copy_ of the previous analysis, still under construction

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG _COPY_

We can rename it

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

CKM live

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Analysis - Define Analysis name

Analysis name

Name

Vcb-SDG-inclusive

Envoyer

This will be the determination of Vcb
coming from the global fit
without input from inclusive semileptonic decays

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INCLUSIVE

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

We must change the input from Vcb, only from inclusive semileptonic decays

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INCLUSIVE

We can change the input from Vcb

Targets | Inputs | Plot

Your input observable(s)

observable	Value	Documentation	Actions
$\|V_{cb}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{cb}\|$			Show parameters...
$\|V_{ud}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ud}\|$			Show parameters...
$\|V_{us}\| \times F_+^{K\pi}(0)$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{us}\| \times F_+^{K\pi}(0)$			Show parameters...
$\|V_{ub}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ub}\|$			Show parameters...

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

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Setting the value of a observable

Edit observable $|V_{cb}|$

In this interface, you can change the properties of your input.
You have two possibilities

- on the left, you can take the input from a reference CKMfitter analysis, either the default value of the datacard **EPS15** for $|V_{cb}|$ or a value from a different scenario
- on the right, you can set your own values (central value, experimental and theoretical value). The central value must be within the range indicated in brackets.

Information for $|V_{cb}|$ can be found on the scenario **EPS15**

Change reference...

Define Reference for the Input

EPS15

Envoyer

2. Continue

... or give your own values (Range for central value [0.01, 0.1])

Notice : you must change the three values at once

Name

|Vcb|

Central value

0.04242

Experimental uncertainty

0.00044

Theoretical uncertainty

0.00074

Envoyer

1. Give the input values

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INCLUSIVE

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

We can check that our value is taken into account

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INCLUSIVE

Targets | Inputs | Plot

Your input observable(s)

observable	Value	Documentation	Actions
$\|V_{cb}\|$	0.04242 ± 0.00044 ± 0.00074	uantity documentation	
✚ Parameters of the observable $\|V_{cb}\|$			Show parameters...
$\|V_{ud}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ud}\|$			Show parameters...
$\|V_{us}\| \times F_+^{K\pi}(0)$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{us}\| \times F_+^{K\pi}(0)$			Show parameters...
$\|V_{ub}\|$	EPS15	Quantity documentation	
✚ Parameters of the observable $\|V_{ub}\|$			Show parameters...

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

The input from Vcb is now changed

CKM live

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INCLUSIVE

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

Before submitting
we have to give the details for the plot

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INCLUSIVE

Targets | Inputs | Plot

Your plot(s)

There is no plot defined for this analysis

Define a plot for this analysis

Choose the next step

- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ **Abort**
- ✔ **Submit**

Notice that...

$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

CKM live

sedescot

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Analysis - Plotting

Parametrise the plotting

This step is not mandatory and it can be skipped clicking the green button "Skip plotting"

Skip plotting step

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

CKM live

By nickname

Please enter a nickname. This will appear on the plot as CKMlive by nickname

SDG

Please enter a title for the plot of the result

Inclusive

Cancel Analysis | Continue

determination of Vcb based on inclusive semileptonic decays

CKM live

sedescot

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the “Target” and “Inputs” thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ VCB-SDG-INCLUSIVE

Targets | Inputs | Plot

Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	

Choose the next step

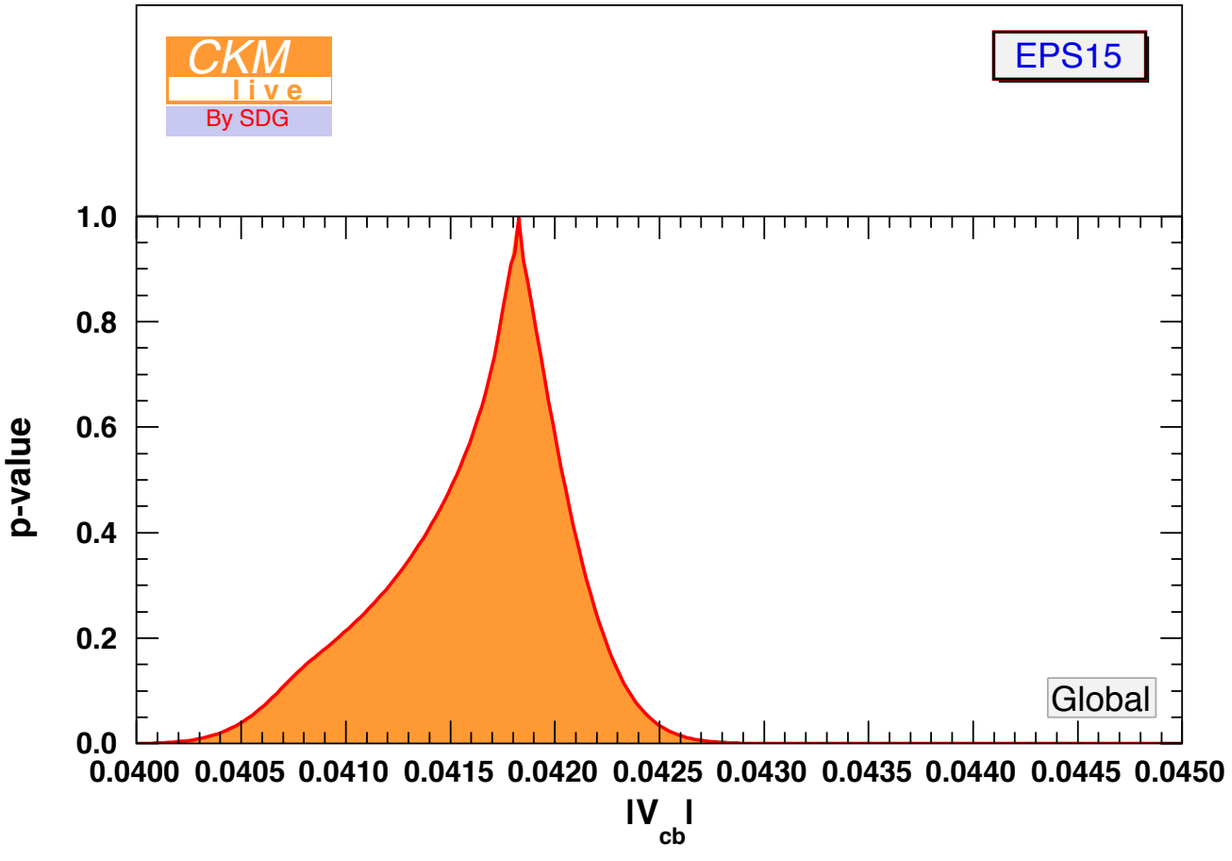
- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ Abort
- ✔ Submit

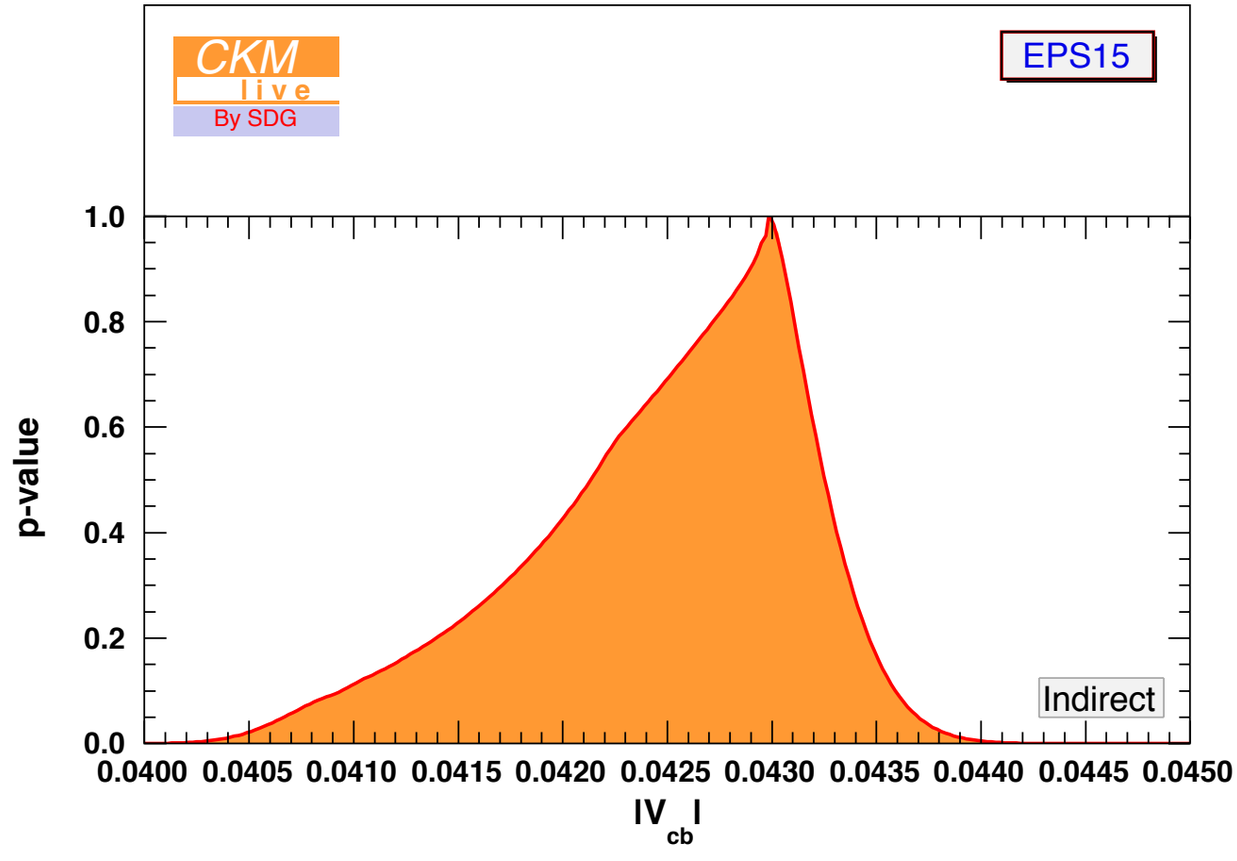
Notice that...

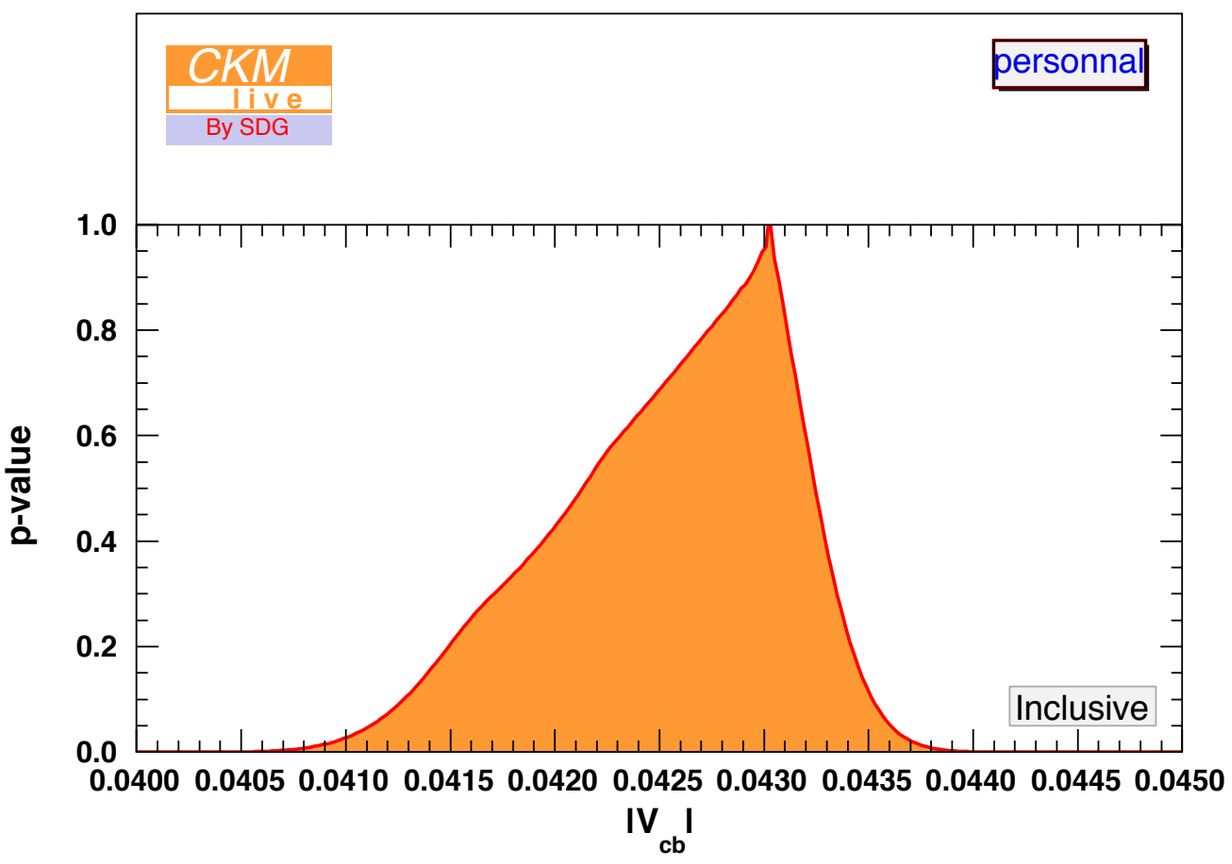
$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

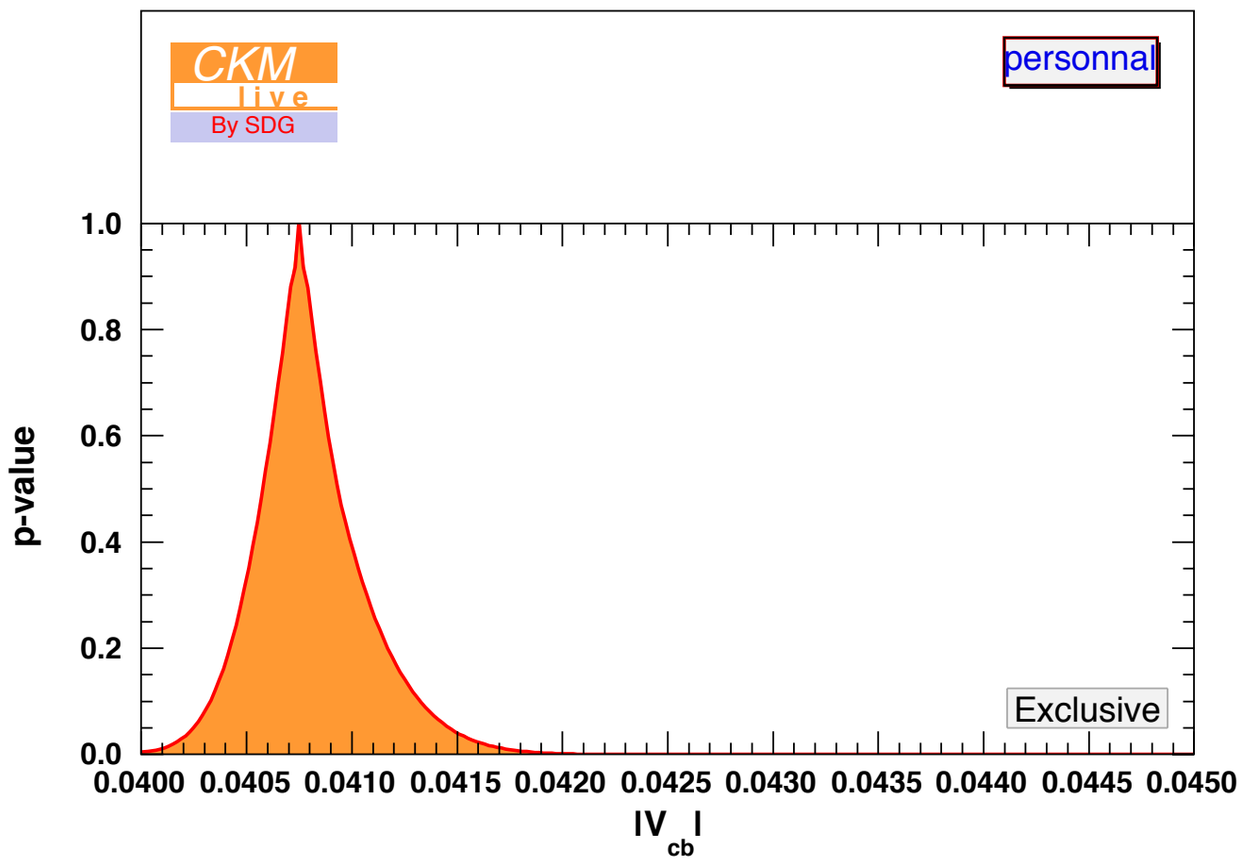
Ignore the input value for the fit

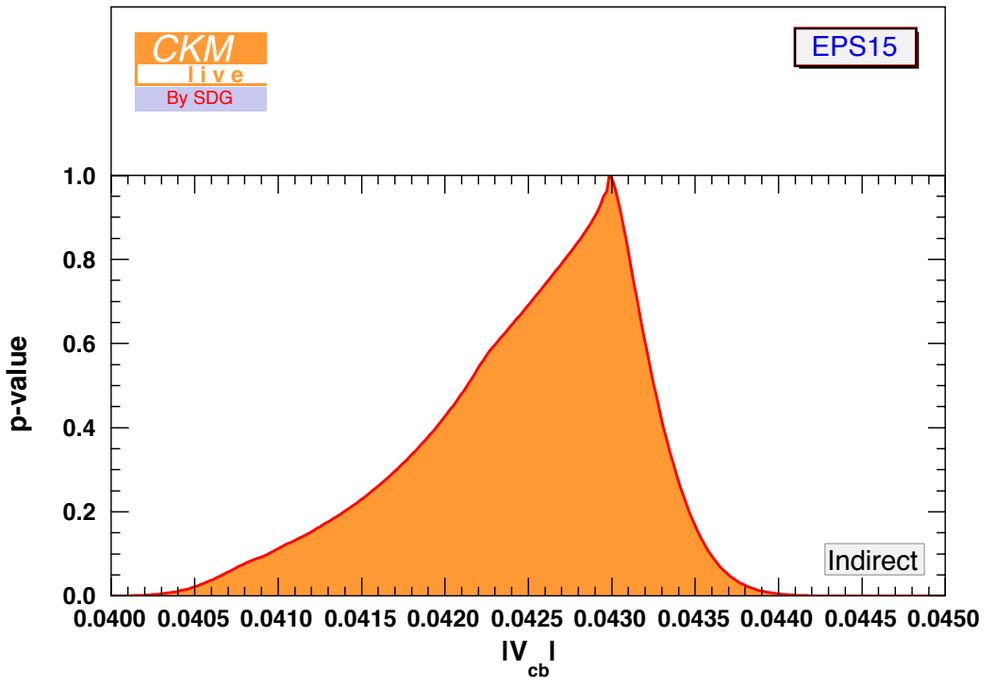
Once the inputs and the plot are fixed, we can submit

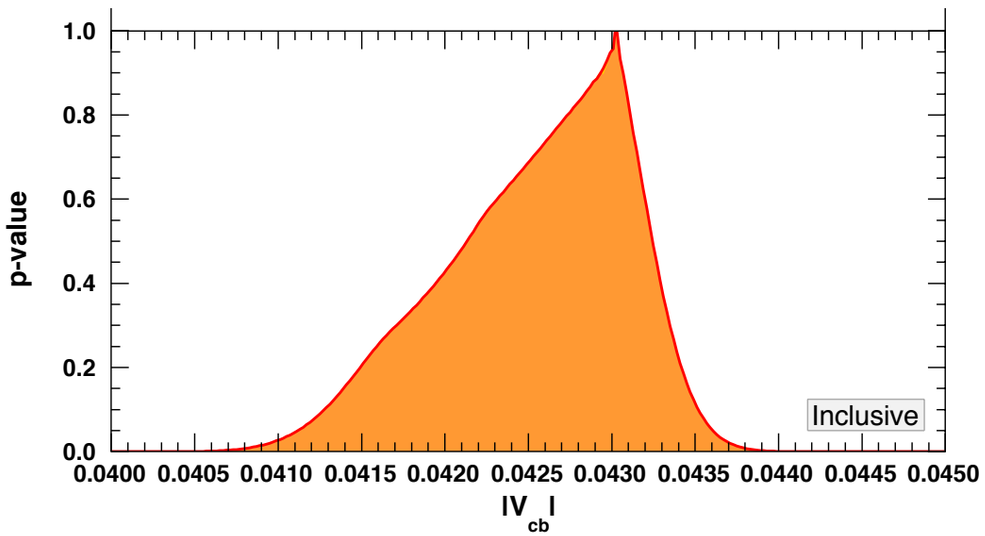

CKM
live
By SDG
EPS15
Global
p-value
1.0
0.8
0.6
0.4
0.2
0.0
0.0400 0.0405 0.0410 0.0415 0.0420 0.0425 0.0430 0.0435 0.0440 0.0445 0.0450
IV_cb I

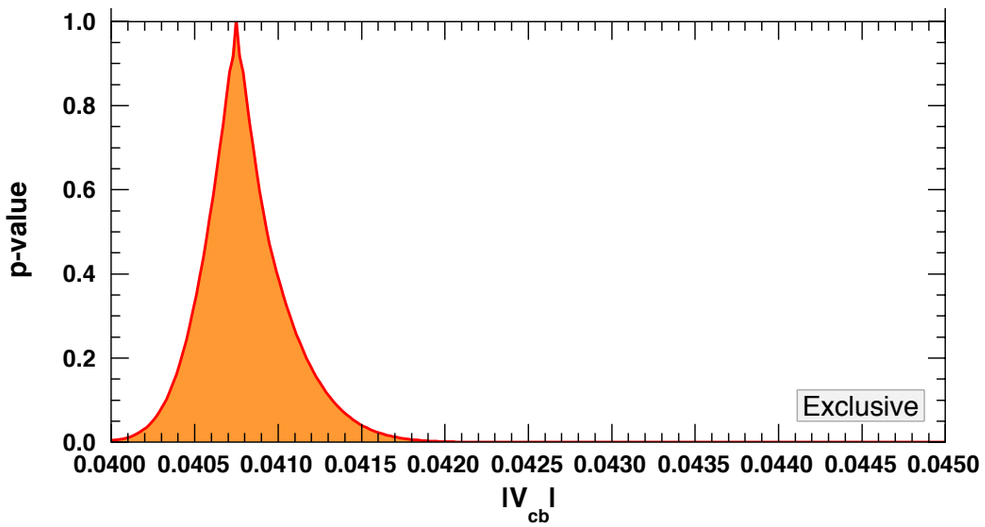

CKM
live
By SDG
EPS15
Indirect
p-value
1.0
0.8
0.6
0.4
0.2
0.0
0.0400 0.0405 0.0410 0.0415 0.0420 0.0425 0.0430 0.0435 0.0440 0.0445 0.0450
IV_cb I

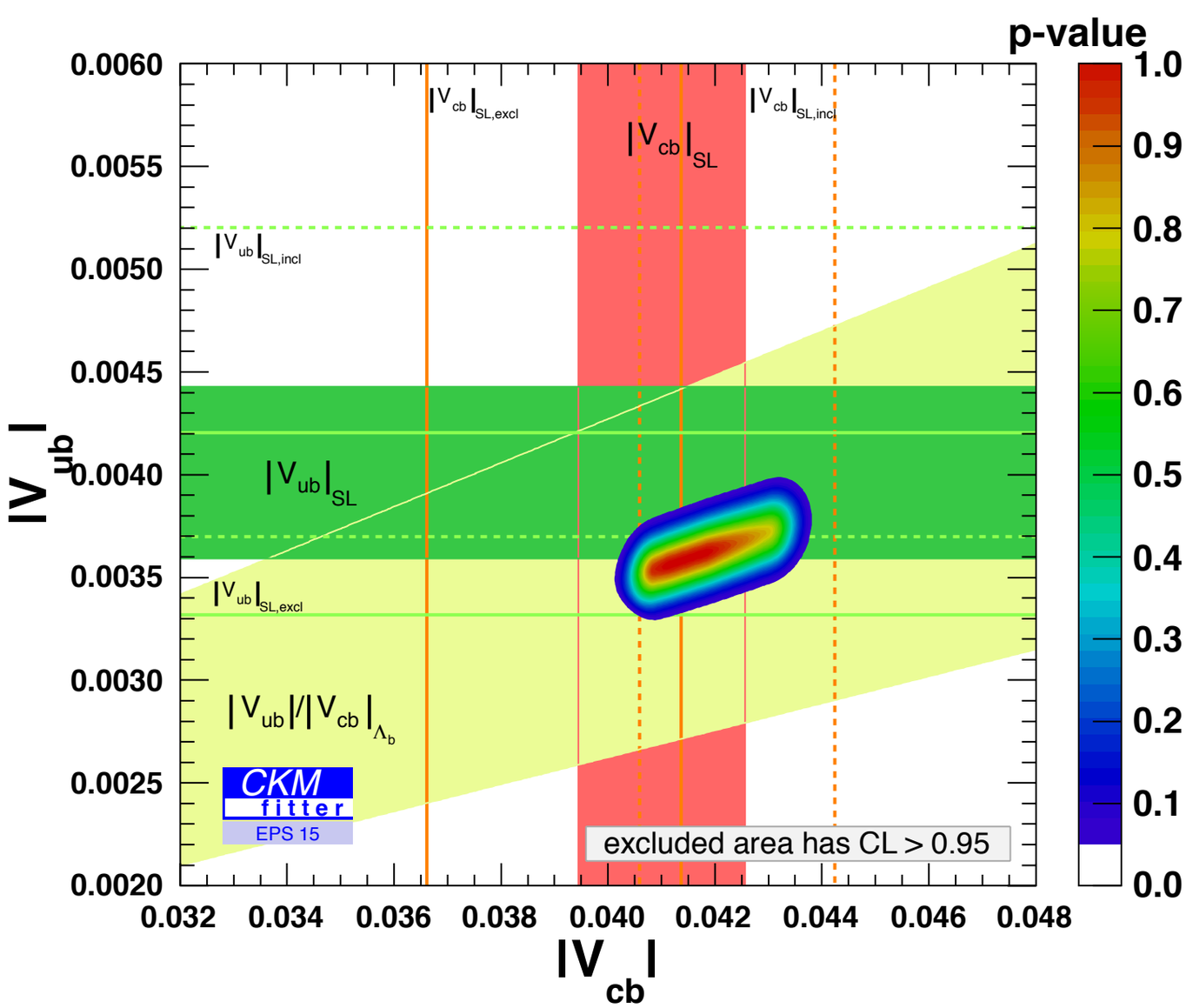

CKM
live
By SDG
personnal
Inclusive
p-value
1.0
0.8
0.6
0.4
0.2
0.0
0.0400 0.0405 0.0410 0.0415 0.0420 0.0425 0.0430 0.0435 0.0440 0.0445 0.0450
IV_cb I


CKM
live
By SDG
personnal
Exclusive
p-value
1.0
0.8
0.6
0.4
0.2
0.0
0.0400 0.0405 0.0410 0.0415 0.0420 0.0425 0.0430 0.0435 0.0440 0.0445 0.0450
IV_cb I





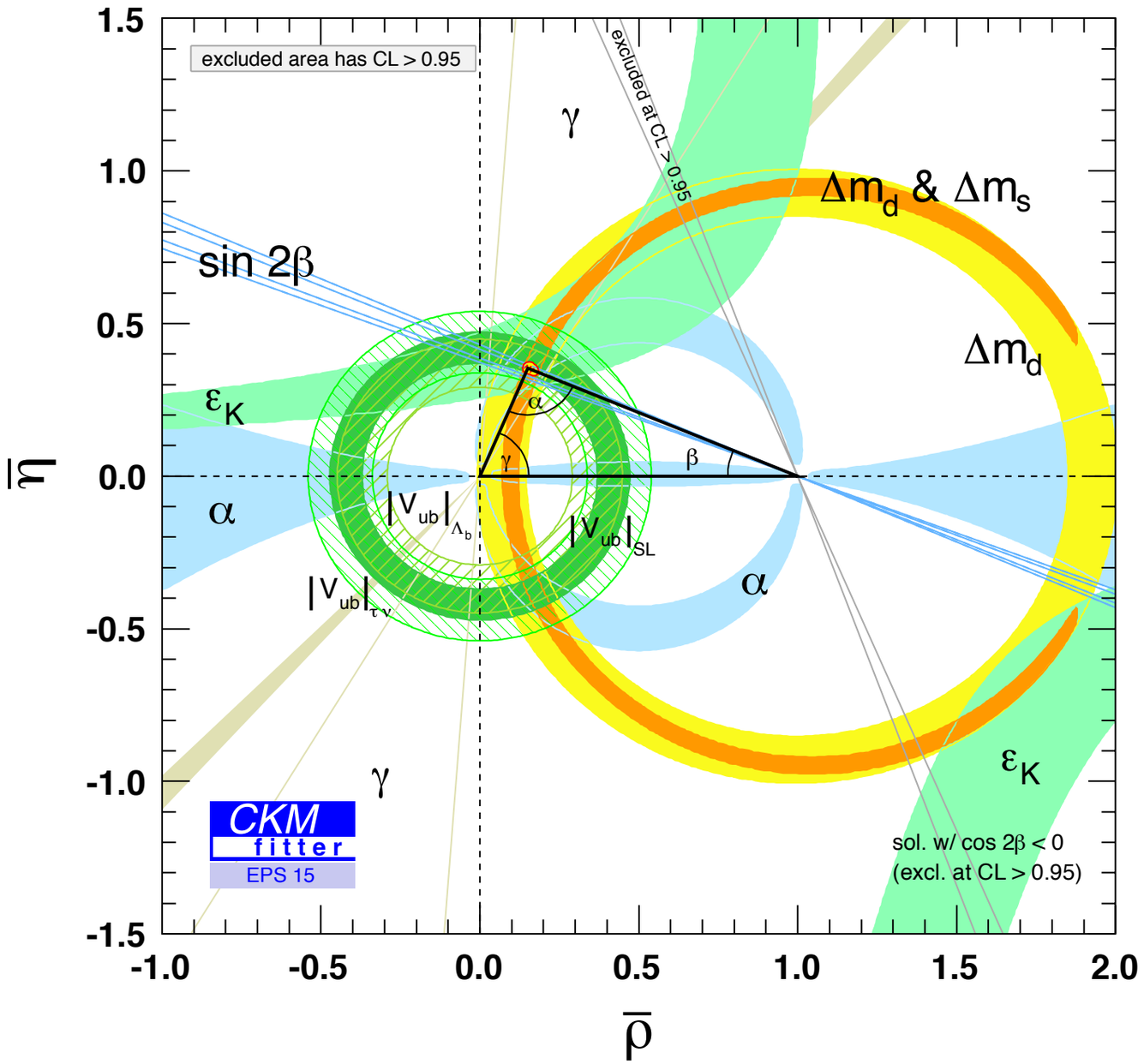




Better agreement between the indirect determination from the global fit and the inclusive input

Fourth exercise

Fourth exercise



- Use the same data as the global fit for EPS15
- Perform the fit for $Br(B \to \tau\nu)$
- Determine the confidence intervals

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Your analyses

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Analysis - Scenario & Scan constraint

Choose your scenario

Select the model and the scenario that will be the basis of your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the “Back” feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

Name

Btaunu-SDG

Scan constraint

1D

Model

Standard Model

Scenario

EPS15

Cancel Analysis

Continue

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Analysis - Target Input

Choose your target

Select the target(s), i.e., the quantity(ies) that you want to constrain through your analysis

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Target observable

Δm_s
$|\epsilon_K|$
$\alpha_S(m_Z)$
$B(B \to \tau\nu)$
$B(K \to e\nu)$
$B(K \to \mu\nu)$
$B(\tau \to K\nu)$
$B_{K\nu 2}/B_{\pi\nu 2}$

A meaningful range for B(B->taunu) can be between 0.00001 and 0.001

Scan min of the first target (B(B->taunu))

0.00006

Scan max of the first target (B(B->taunu))

0.00010

Target parameter

A
λ
$\bar{\rho}$
$\bar{\eta}$
B_s
$\frac{B_{B_s}}{B_{B_d}}$
f_{B_s}

✖ Cancel Analysis Continue

Analysis - Input Element

Choose your inputs

Select the inputs, i.e., the quantities that will be used to constrain your target

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

You can cancel the current selection by typing CTRL and selecting another element (on Unix/Windows) or by typing Command reselecting the selection (on Mac OS).

You can select several elements by pressing Command/Alt (on Mac OS) or shift (on Unix/Windows) at the time of selection

Information on this scenario (including the default input values) can be found on the **EPS15 documentation page**

Inputs

Recommended Global Fit

$|V_{ud}|$
$|V_{us}| \times F_{+}^{K\pi}(0)$
$|V_{ub}|$
$|V_{cb}|$
α
$\sin 2\beta$
$\cos 2\beta$
γ
Δm_d
Δm_s
$|\epsilon_K|$
$\alpha_S(m_Z)$
$B(B \to \tau\nu)$
$B(K \to e\nu)$
$B(K \to \mu\nu)$
$B(\tau \to K\nu)$
$B_{K\mu 2}/B_{\pi\mu 2}$
$B_{\tau K2}/B_{\tau\pi 2}$

Additional observables

$2\beta_{sb}$

Your target choice

✔ $B(B \to \tau\nu)$ $[\ 6.0E-5\ ,\ 0.0001\ ]$

✖ Cancel Analysis Continue

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Analysis - Plotting

Parametrise the plotting

This step is not mandatory and it can be skipped clicking the green button "Skip plotting"

Skip plotting step

Each step will help you to define the elements of your analysis. If you have already completed one step but change your mind, please do not use the "Back" feature of your browser. Instead, keep on following the steps up to the summary of your analysis, where you will be able to modify the information already provided, if necessary.

CKM live
By nickname

Please enter a nickname. This will appear on the plot as CKMlive by nickname

SDG

Please enter a title for the plot of the result

Global

Cancel Analysis Continue

Home

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Personalise your analysis

You can change the value of any input by clicking on the associated green button (both in the "Target" and "Inputs" thumbnails). You can see the parameters on which a given input depends by clicking on the corresponding grey button

✱ BTAUNU-SDG

Targets | Inputs | Plot

Your Target(s)

✔ $B(B \to \tau\nu)$ $[6.0E-5, 0.0001]$

Parameter	Value	Documentation	Edit
A	none	Quantity documentation	
λ	none	Quantity documentation	
$\bar{\rho}$	none	Quantity documentation	
$\bar{\eta}$	none	Quantity documentation	
f_{B_s}	EPS15	Quantity documentation	
$\frac{f_{B_s}}{f_{B_d}}$	EPS15	Quantity documentation	

Choose the next step

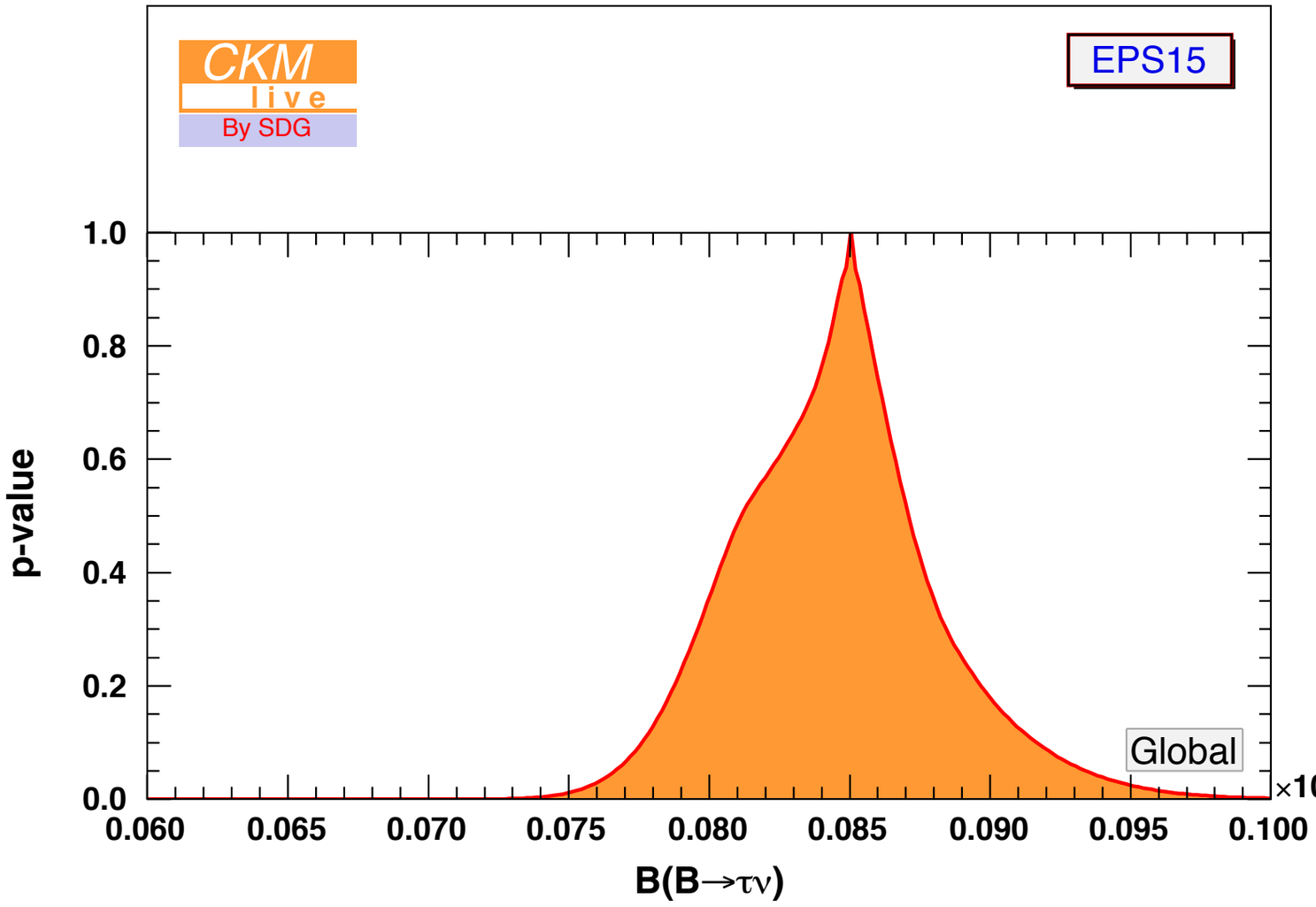
- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ Abort
- ✔ Submit

Notice that...

$B(B \to \tau\nu)$ is a target for which an input value is given and will be included in the fit

Ignore the input value for the fit

```
//
//     global minimum Chi2 = 12.7774 has been found
//     A -> 0.822647
//     lambda -> 0.225482
//     rhobar -> 0.150596
//     etabar -> 0.353741
//     etaB -> 0.5502410491146779
//     fBs -> 0.226037
//     Bs -> 1.30575
//     fBs/fBd -> 1.2113
//     Bs/Bd -> 1.04103
//     fK -> 0.15582
//     BK -> 0.775074
//     delta1 -> 2.87329
//     etact -> 0.5254138940972645
//     etatt -> 0.5706058479361761
//     kappa_epsilonK -> 0.960522
//     mtbar -> 165.799
//     mcbar -> 1.27939
//     LambdaQCD -> 0.240442
//     fK/fpi -> 1.19237
//     deltaKl2Rad -> -0.00733899572619106
//     deltatauK2Rad -> 0.00460182044342889
//     F+Kpi(0) -> 0.959774
//     scan.B(B->taunu) -> 0.00008504000000000001
//
//     approximate pValue (from Prob) is 46.5 %
//
//     B(B->taunu) = 0.0000850 [+0.0000032 -0.0000053](1sigma)
//     B(B->taunu) = 0.0000850 [+0.0000086 -0.0000085](2sigma)
//     B(B->taunu) = 0.000085 [+0.000014 -0.000011](3sigma)
//
//     TeX B(B->taunu) & $0.0000850^{+0.0000032}_{-0.0000053}$ &
$0.0000850^{+0.0000086}_{-0.0000085}$ & $0.000085^{+0.000014}_{-0.000011}$ \\
//
//     Chi2Min = 12.7774 is substracted
//
//     column format: xbin (ybin)  x  (y)  Chi2|1-p  p-value
//
//     end of header
157.129 0.0000850606 0.001 0.974773
1 0.00006008 68.6496 1.17609E-16
2 0.00006024 67.5438 2.06058E-16
3 0.0000604 66.449 3.59064E-16
4 0.00006056 65.3654 6.22218E-16
5 0.00006072 64.2926 1.07248E-15
6 0.00006088 63.2307 1.8386E-15
7 0.00006104 62.1799 3.13471E-15
```



CI for B(B->tau nu) from the global fit (one could compute also the indirect prediction for this quantity)