# CKMfitter and CKMlive

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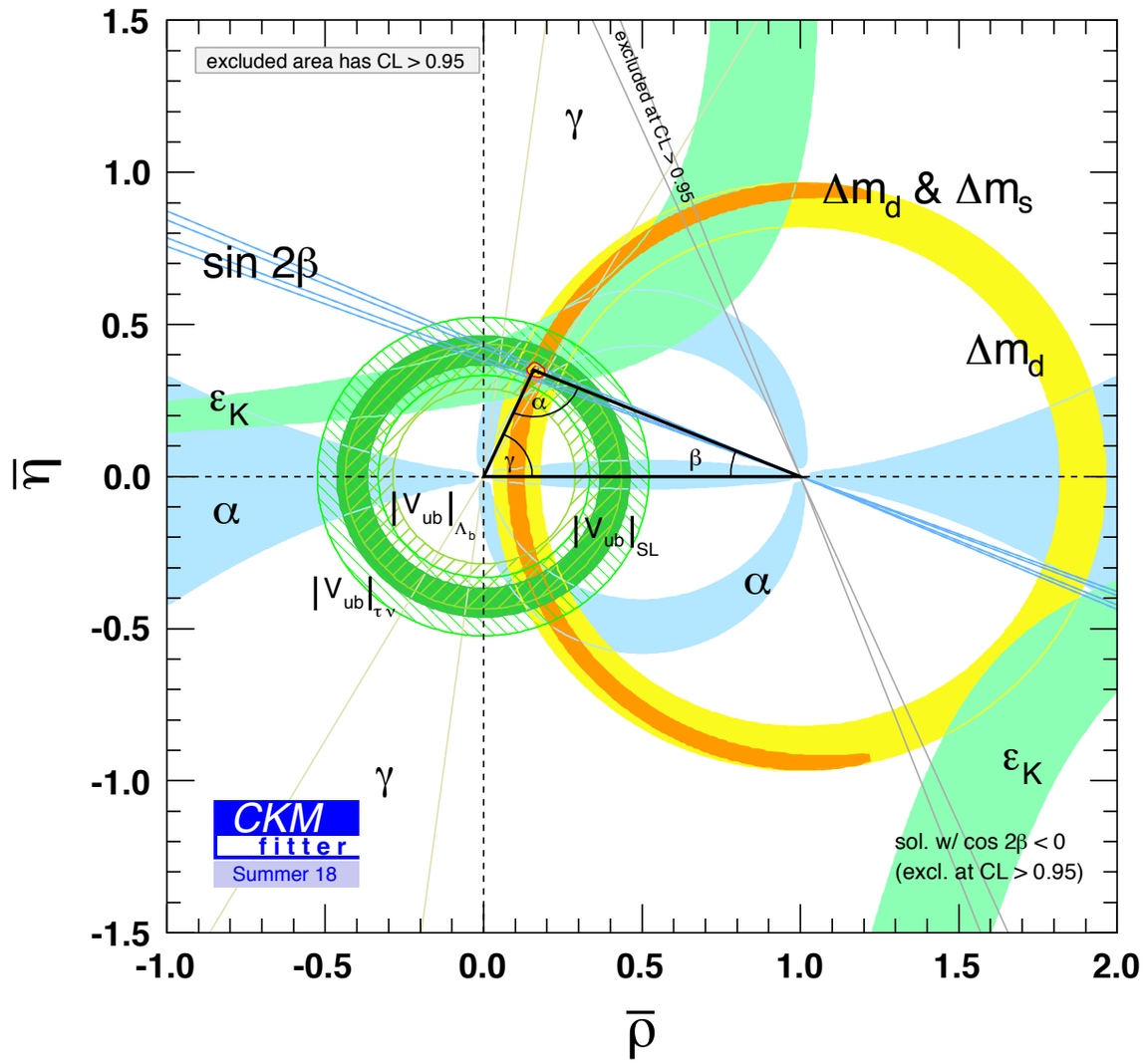
KMI, Nagoya, Feb 23rd 2019

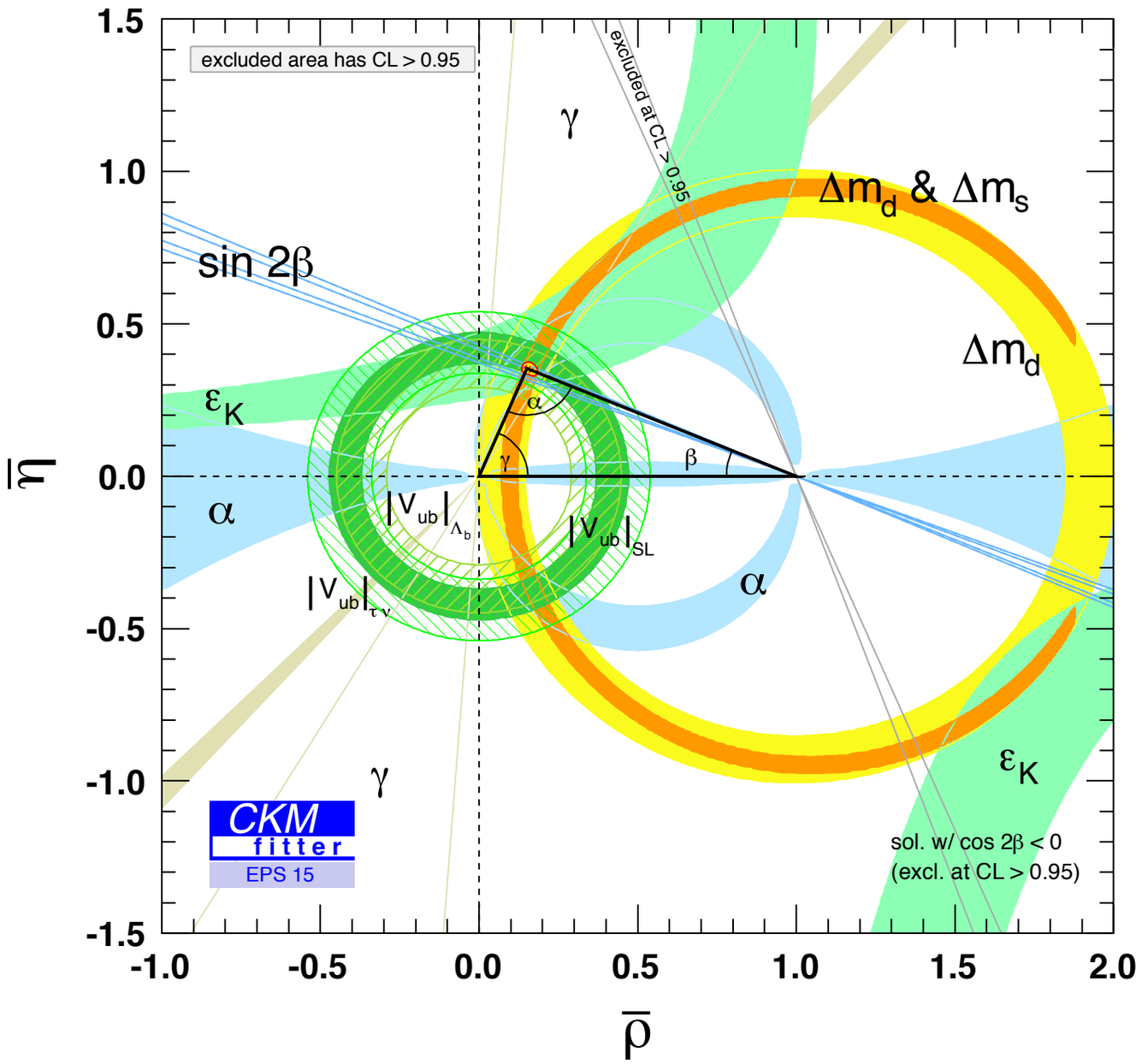

# Outline




- Determining the CKM matrix parameters (physics and statistics)
- Implementing in a software (CKMfitter and 1st tutorial)
- Using the web-based interface (CKMlive 2nd tutorial)

# A second exercise with CKMlive

# 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

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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**

rhobaretabar-SDG

**Scan constraint**

2D

**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

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**

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

**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

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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**

$|V_{ud}|$
$|V_{us}| \times F_+^{K\pi}(0)$
$|V_{ub}|$
$|V_{cb}|$
$\alpha$
$\sin 2\beta$
$\cos 2\beta$
$\gamma$
$\Delta m_d$
$\Delta m_s$
$|\epsilon_K|$
$\alpha_S(m_Z)$
$B(B \to \tau\nu)$
$B(K \to e\nu)$
$B(K \to \mu\nu)$
$B(\tau \to K\nu)$
$B_{K\mu 2}/B_{\pi\mu 2}$
$B_{\tau K2}/B_{\tau\pi 2}$

**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

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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 fit

Cancel Analysis

Continue

1.Give a nickname and a title

2. Continue

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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

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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

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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 $\|V_{ud}\|$ |
| $\lambda$ | none | Quantity documentation | See $\lambda$ 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

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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

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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

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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

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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 | | |

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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

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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

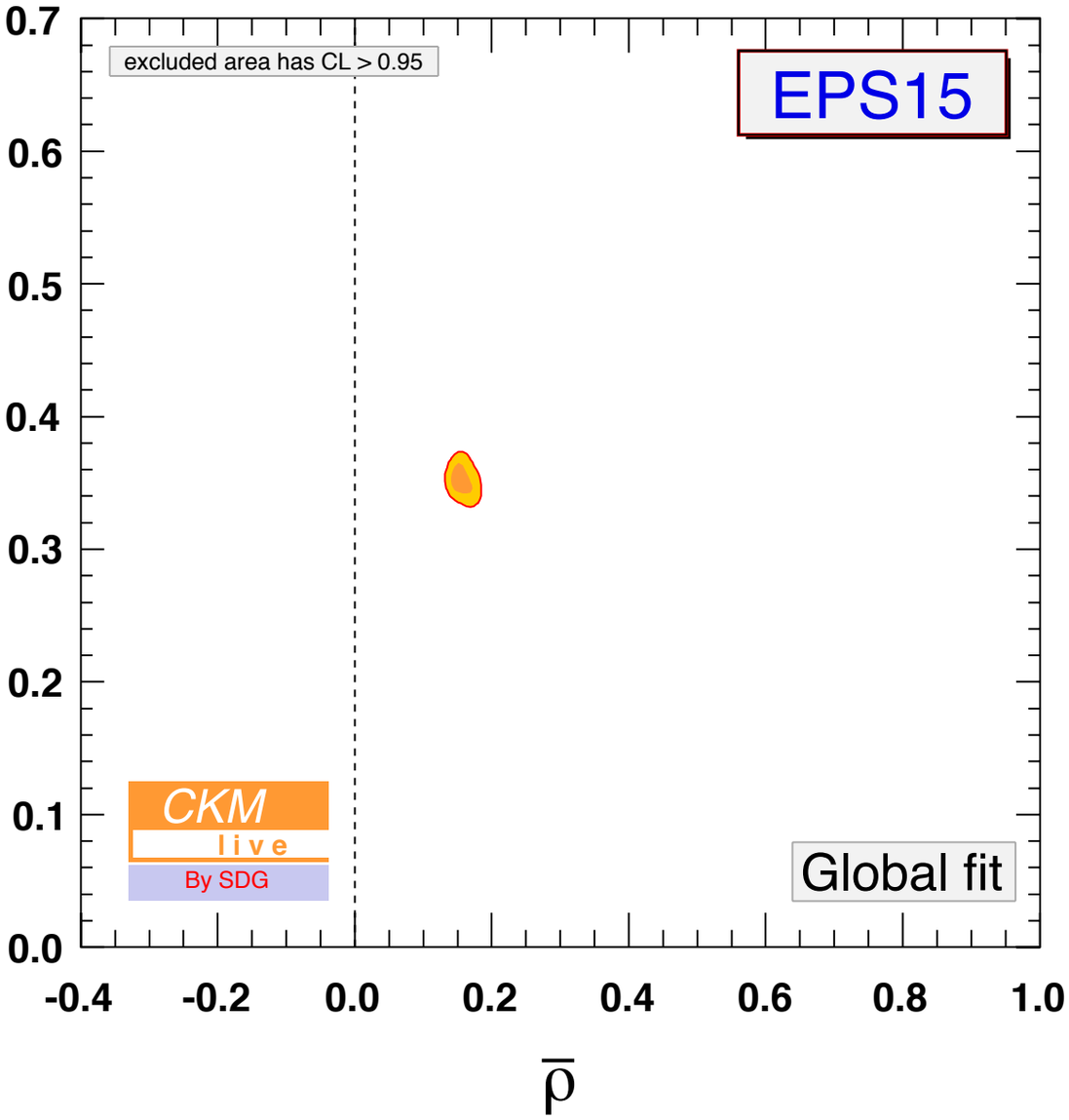
Obtain the results

### Choose the next step

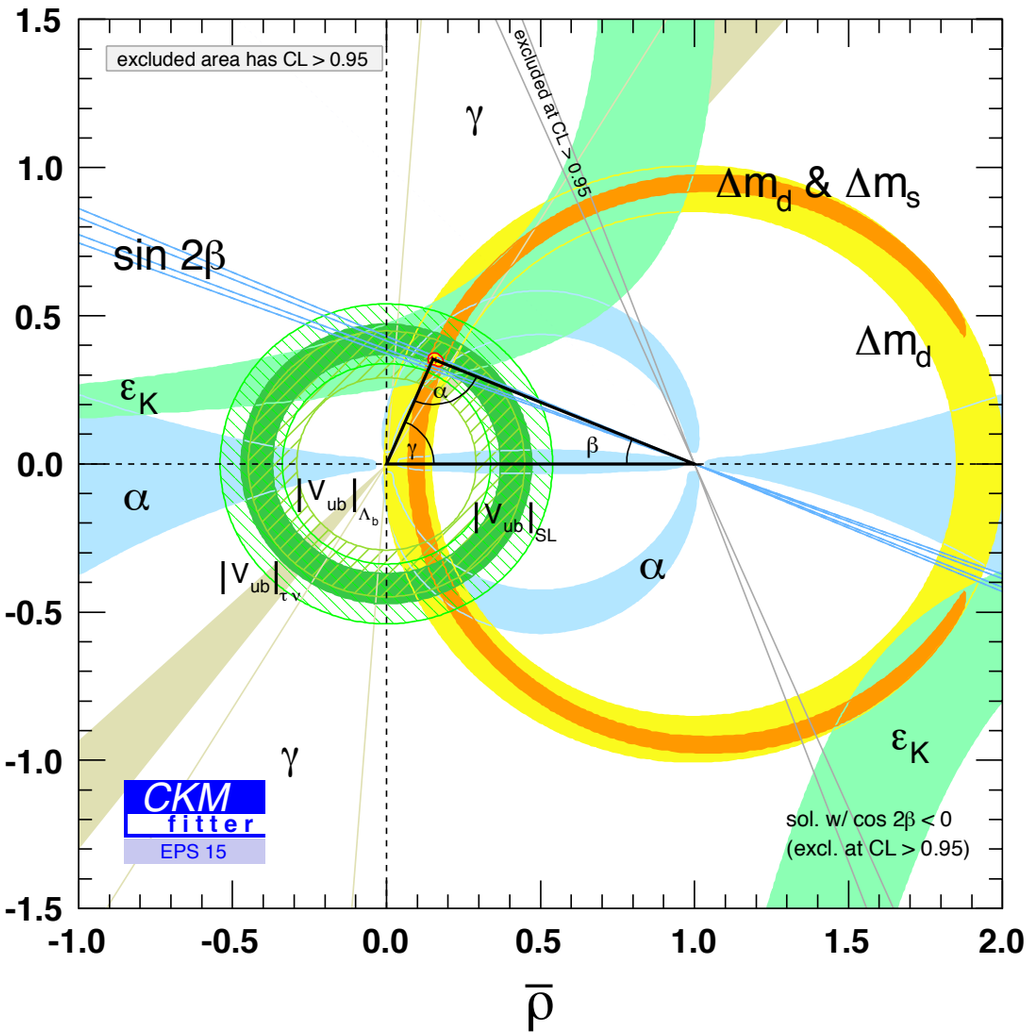
✔ See datacard

✔ **Duplicate the analysis**

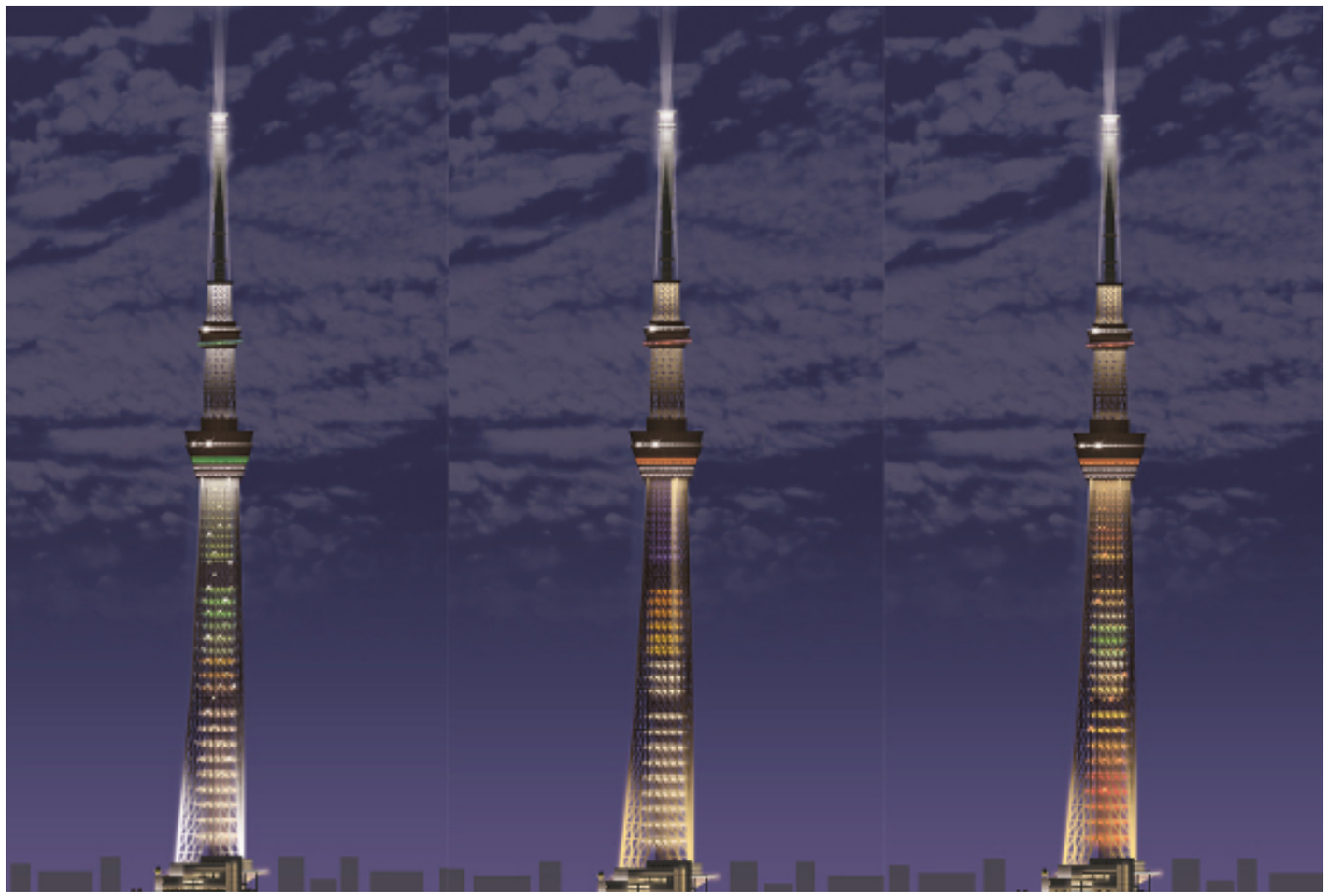
Plot file obtained as before



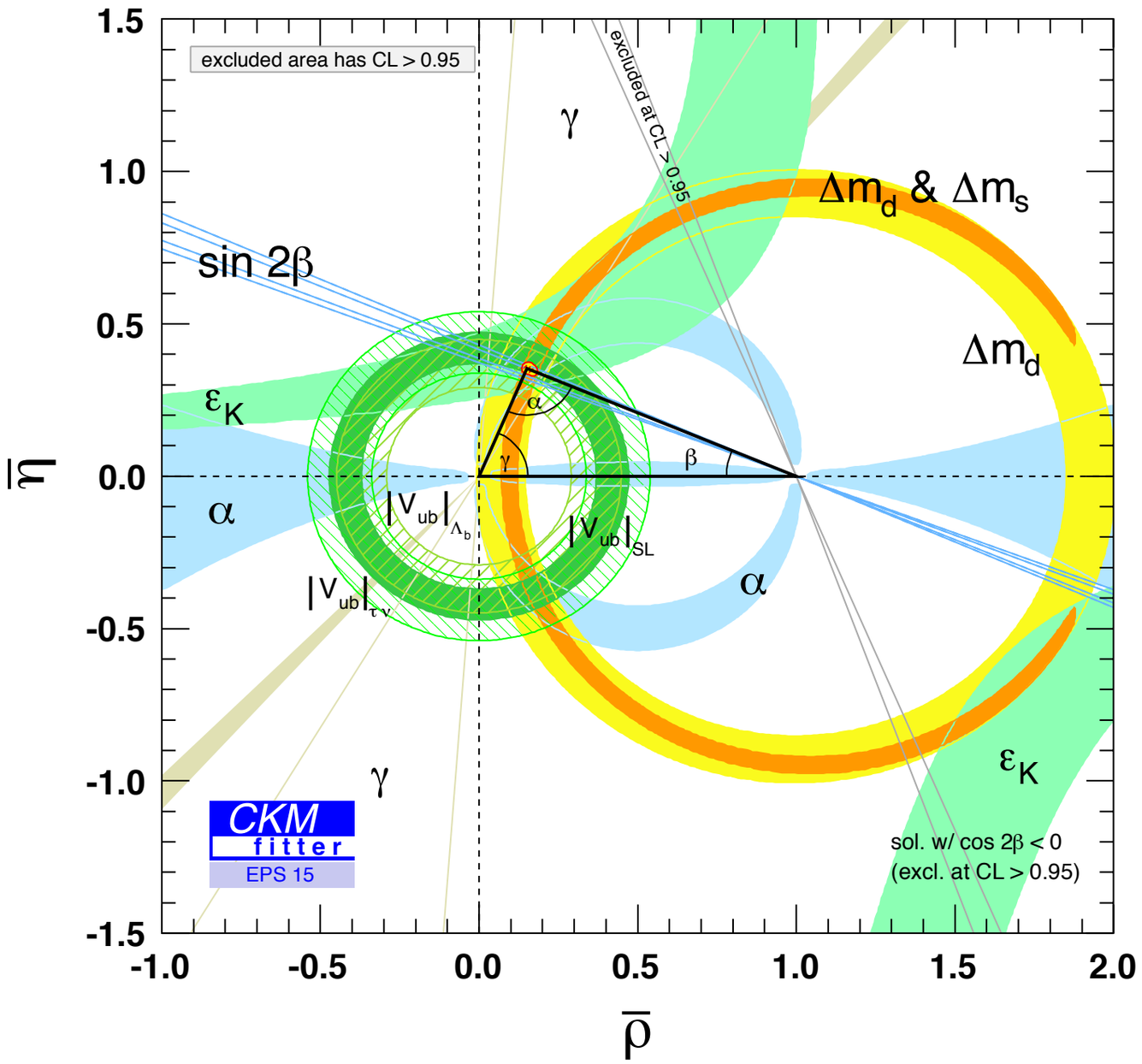

The plots with the different (individual constraints) are obtained by drawing the 2D constraints for subset of observables



# A third exercise with CKMlive



# 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

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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

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**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.

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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**

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

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**

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

✖ 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.

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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**

**Inputs**

**Recommended Global Fit**

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

**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

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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 | |
| $\lambda$ | 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

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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

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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 | | |

# 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 [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 | |
| $\lambda$ | 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 | |
| $\lambda$ | 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

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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

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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 | |
| $\lambda$ | 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 | |
| $\lambda$ | 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 | |
| $\lambda$ | 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

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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

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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 | |
| $\lambda$ | 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 | |
| $\lambda$ | 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 | |
| $\lambda$ | 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

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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 | |
| $\lambda$ | 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-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 | |
| $\lambda$ | 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

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

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

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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

**... 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

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

## ✱ VCB-SDG-EXCLUSIVE

Targets | Inputs | Plot

### Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

| Parameter | Value | Documentation | Edit |
|---|---|---|---|
| $A$ | none | Quantity documentation | |
| $\lambda$ | 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

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-EXCLUSIVE

Targets | Inputs | Plot

### Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

| Parameter | Value | Documentation | Edit |
|---|---|---|---|
| $A$ | none | Quantity documentation | |
| $\lambda$ | 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

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**

Exclusive

Cancel Analysis | Continue

determination of Vcb based on exclusive 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-EXCLUSIVE

Targets | Inputs | Plot

### Your Target(s)

✔ $|V_{cb}|$ $[0.04, 0.045]$

| Parameter | Value | Documentation | Edit |
|---|---|---|---|
| $A$ | none | Quantity documentation | |
| $\lambda$ | 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

# 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 | |
| $\lambda$ | 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 | |
| $\lambda$ | 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

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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

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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 | |
| $\lambda$ | 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-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 | |
| $\lambda$ | 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**

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

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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

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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 | |
| $\lambda$ | 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

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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

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 | |
| $\lambda$ | 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

# 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 | |
| $\lambda$ | none | Quantity documentation | |
| $\bar{\rho}$ | none | Quantity documentation | |
| $\bar{\eta}$ | none | Quantity documentation | |

### Choose the next step

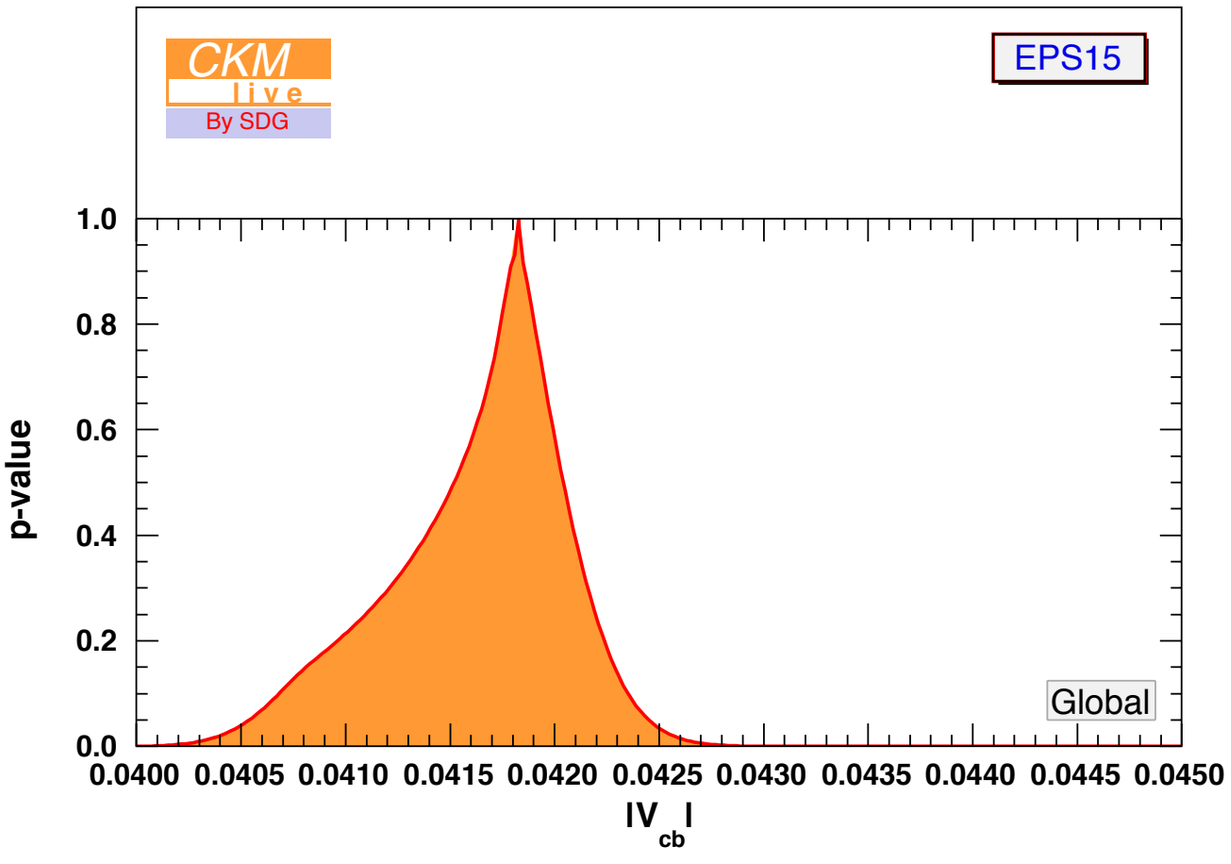
- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ Abort
- ✔ Submit

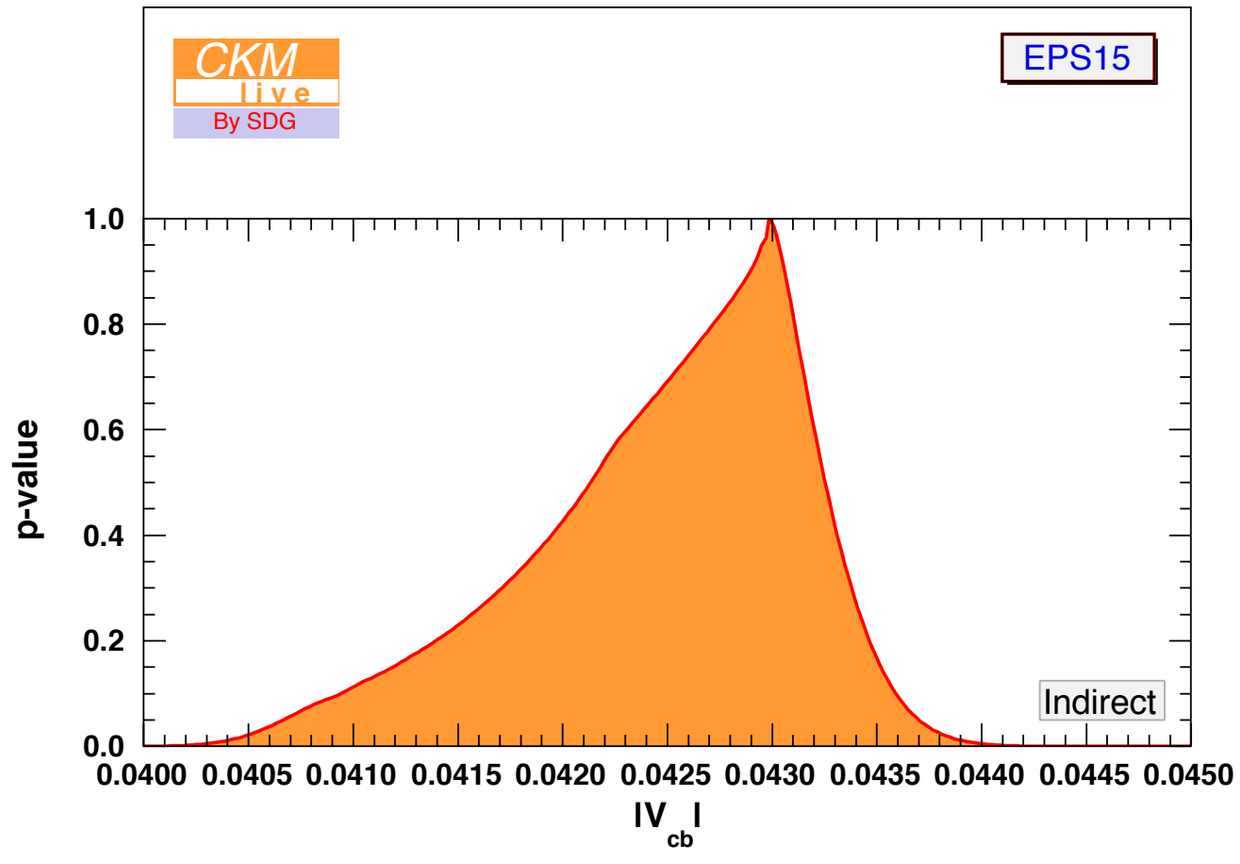
### Notice that...

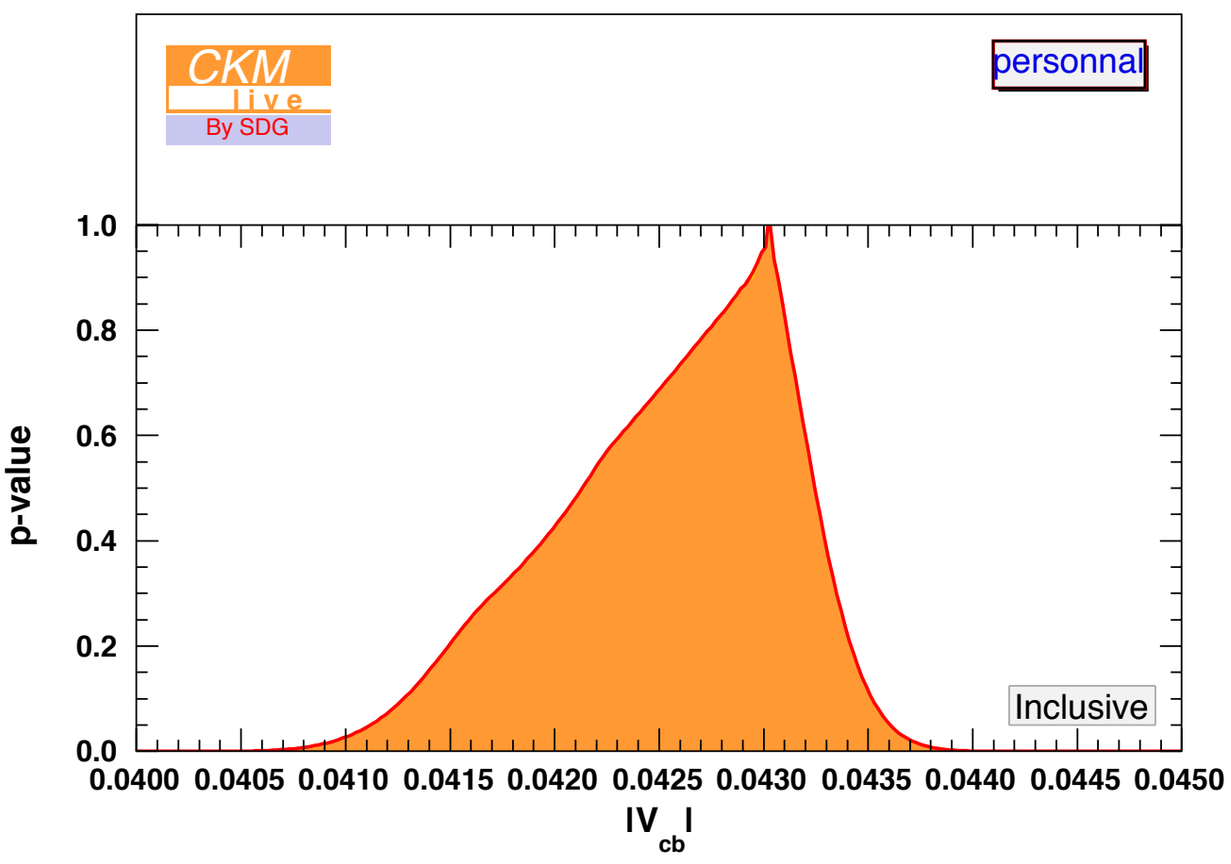
$|V_{cb}|$ is a target for which an input value is given and will be included in the fit

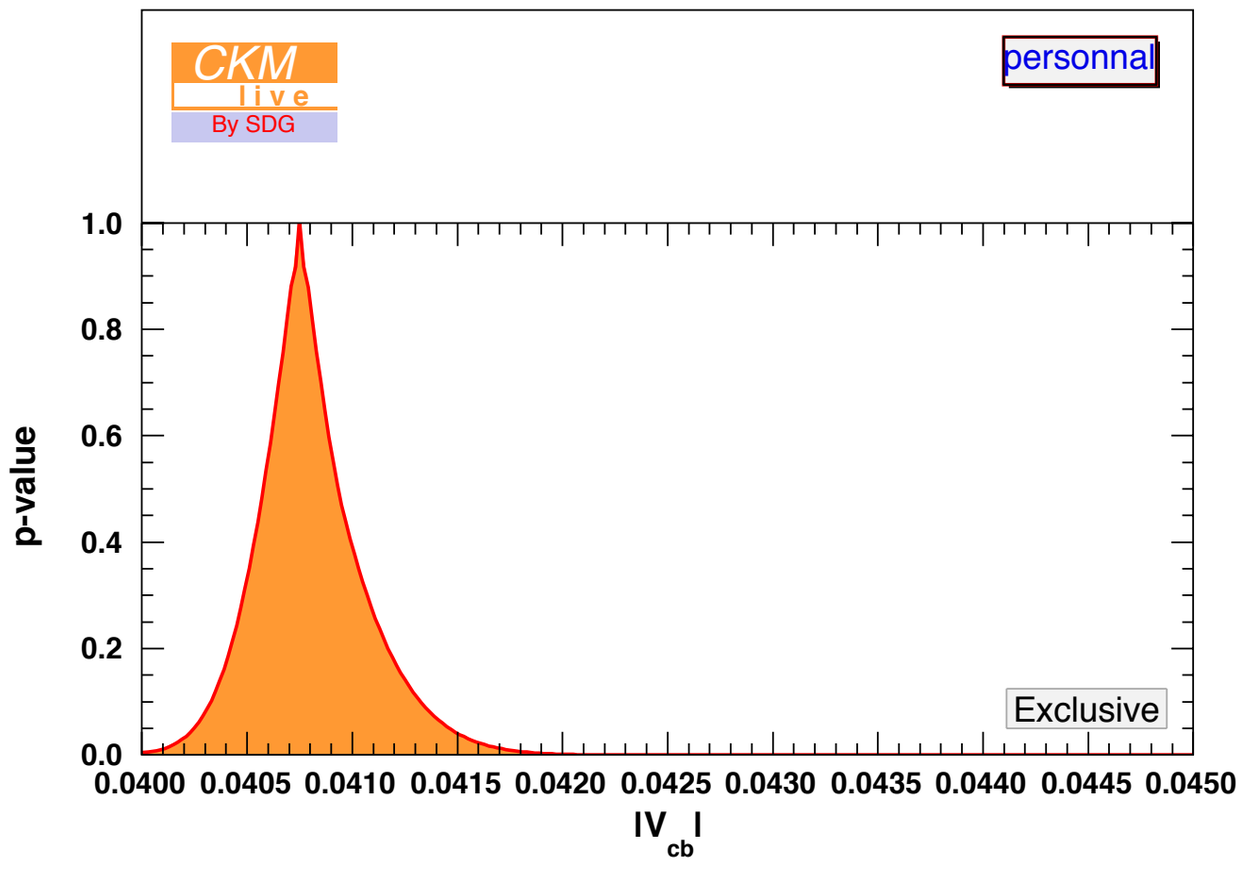
Ignore the input value for the fit

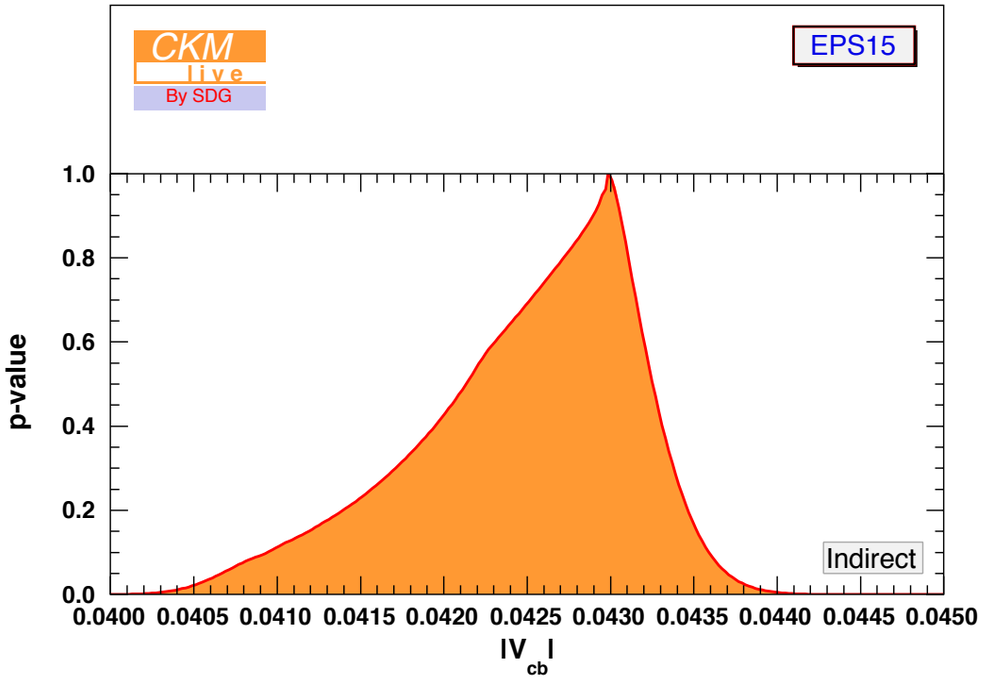
Once the inputs and the plot are fixed, we can submit

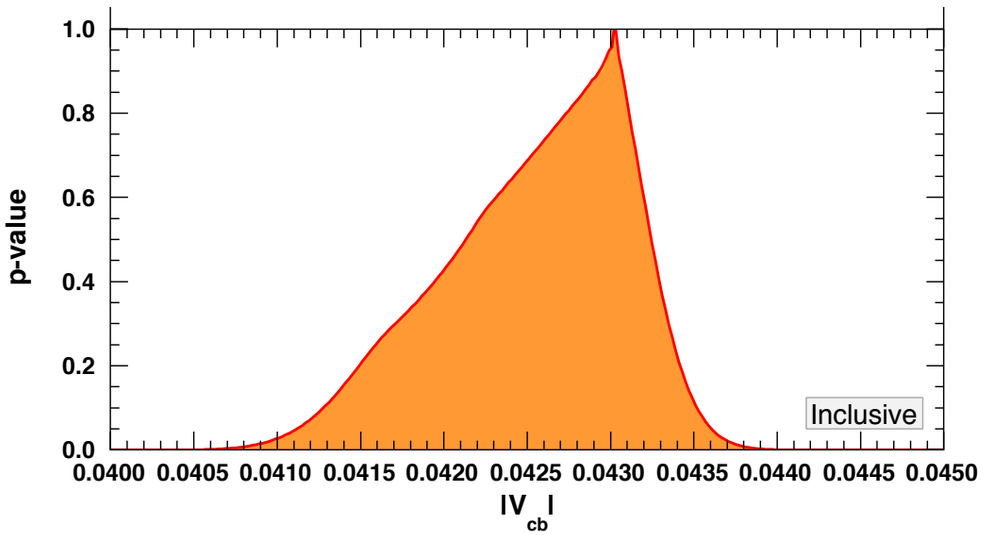

CKM
live
By SDG
EPS15
Global
p-value
1.0
0.8
0.6
0.4
0.2
0.0
0.0400 0.0405 0.0410 0.0415 0.0420 0.0425 0.0430 0.0435 0.0440 0.0445 0.0450
IV_cb I

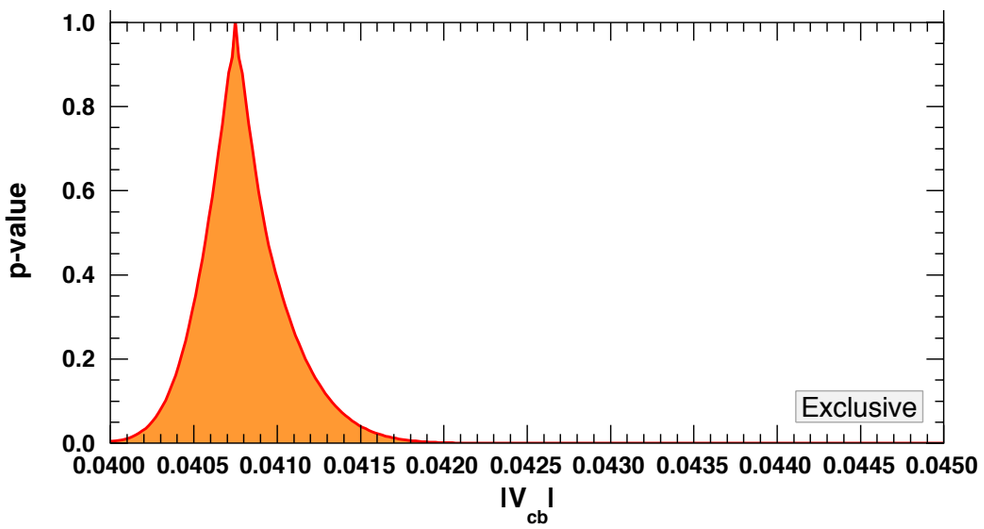

CKM
live
By SDG
EPS15
Indirect
p-value
1.0
0.8
0.6
0.4
0.2
0.0
0.0400 0.0405 0.0410 0.0415 0.0420 0.0425 0.0430 0.0435 0.0440 0.0445 0.0450
IV_cb I

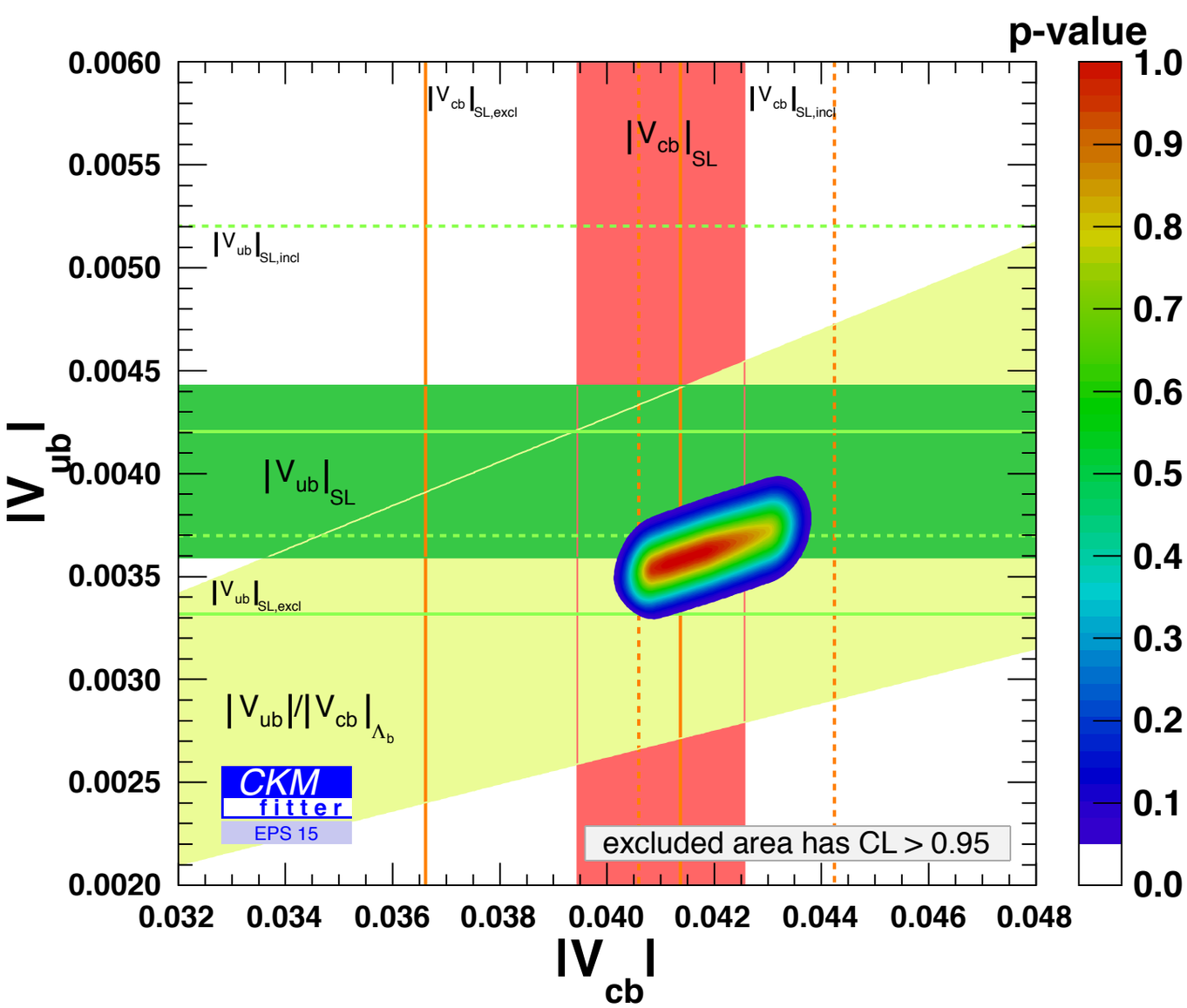

CKM
live
By SDG
personnal
Inclusive
p-value
1.0
0.8
0.6
0.4
0.2
0.0
0.0400 0.0405 0.0410 0.0415 0.0420 0.0425 0.0430 0.0435 0.0440 0.0445 0.0450
IV_cb I


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



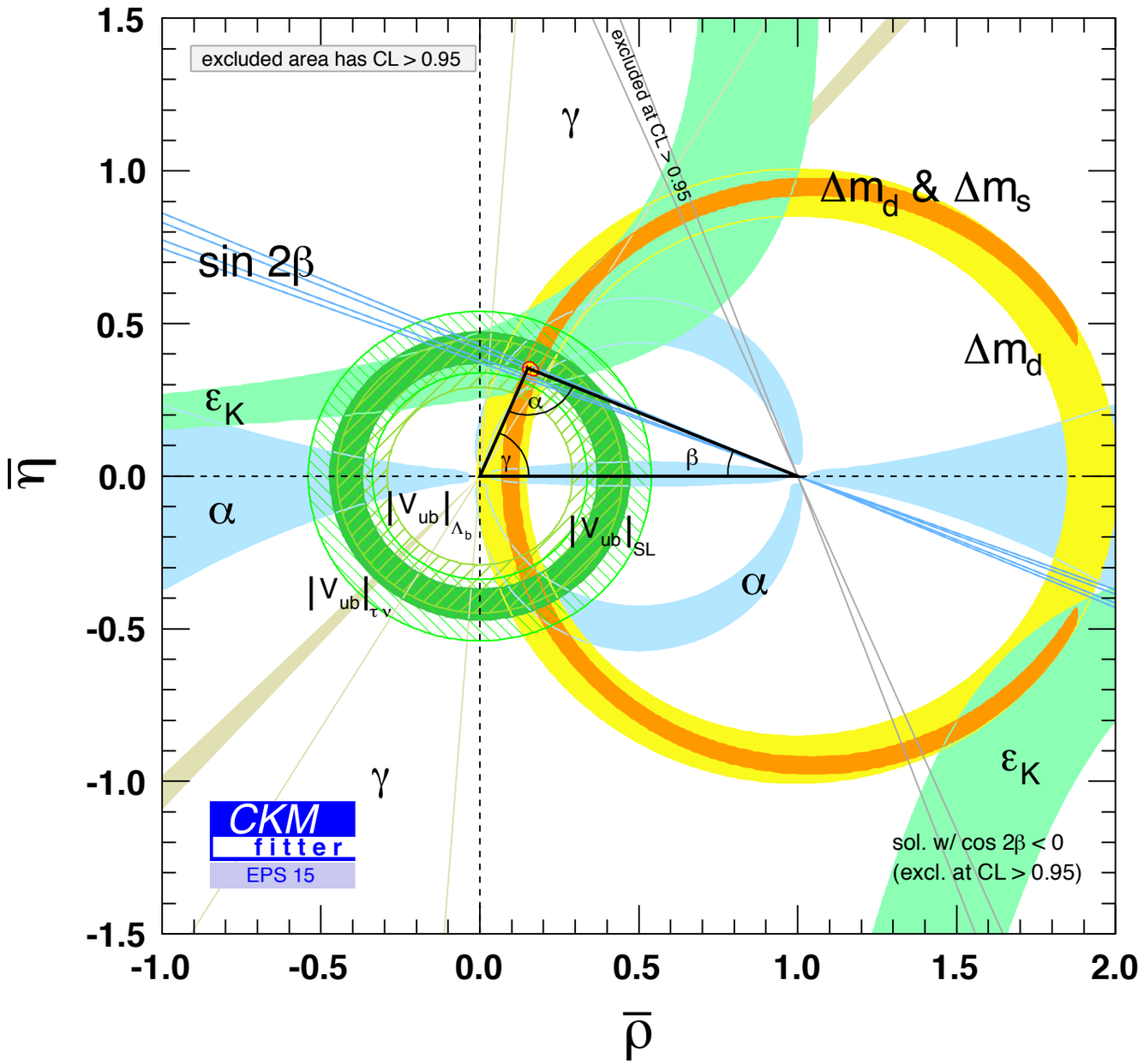




Better agreement between the indirect determination from the global fit and the inclusive input

# A fourth exercise with CKMlive

# 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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# 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**

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

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**

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

✖ 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**

$|V_{ud}|$
$|V_{us}| \times F_{+}^{K\pi}(0)$
$|V_{ub}|$
$|V_{cb}|$
$\alpha$
$\sin 2\beta$
$\cos 2\beta$
$\gamma$
$\Delta m_d$
$\Delta m_s$
$|\epsilon_K|$
$\alpha_S(m_Z)$
$B(B \to \tau\nu)$
$B(K \to e\nu)$
$B(K \to \mu\nu)$
$B(\tau \to K\nu)$
$B_{K\mu 2}/B_{\pi\mu 2}$
$B_{\tau K2}/B_{\tau\pi 2}$

**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

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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 | |
| $\lambda$ | 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

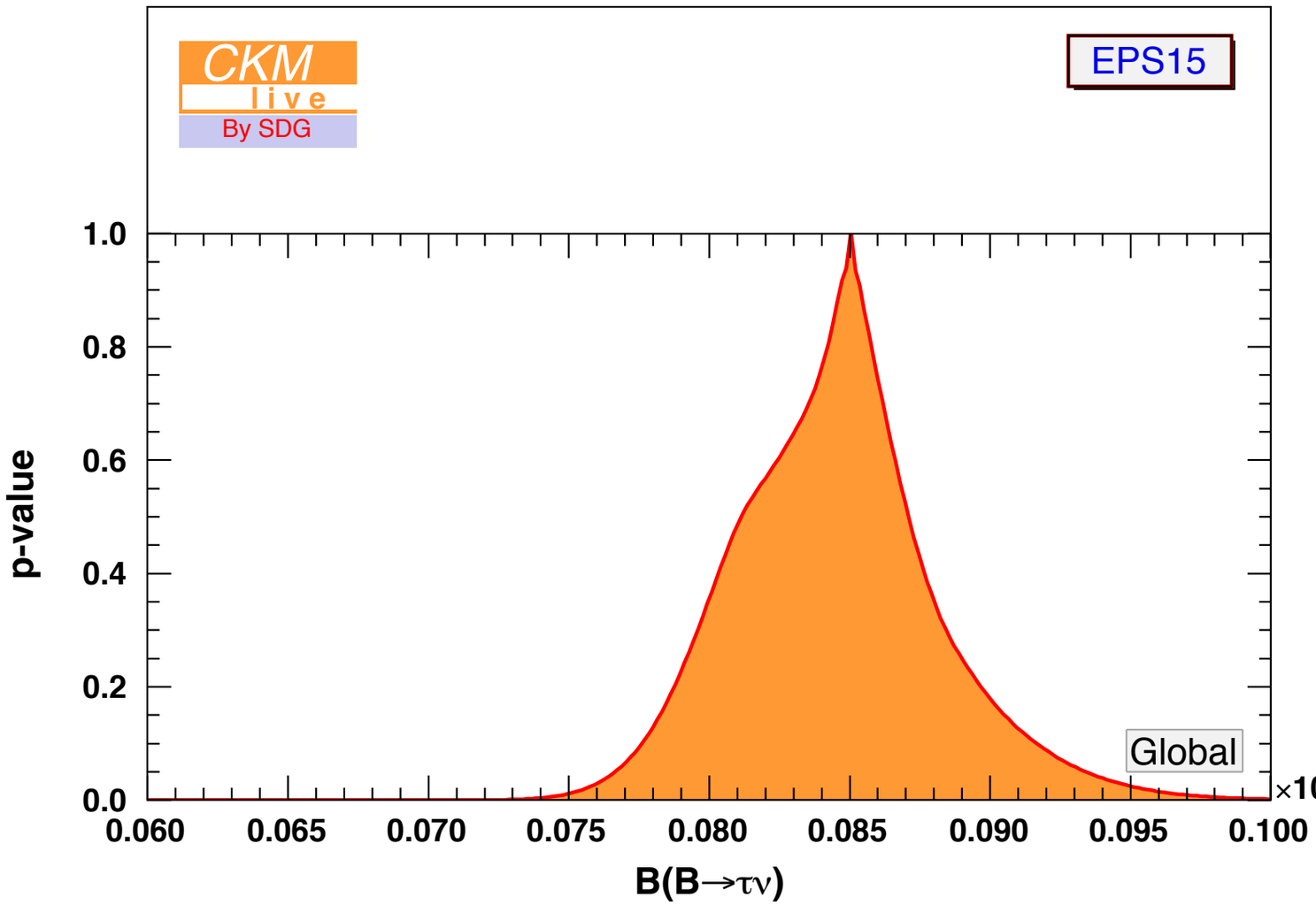
- ✔ Redefine target
- ✔ Redefine input
- ✔ See datacard
- ✔ Abort
- ✔ Submit

### 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)

# Any questions ?