`flavio` - a Python package for flavour physics and other precision tests of the Standard Model

- `flavio` docs: https://flav-io.github.io
- `flavio` source: https://github.com/flav-io/flavio

`flavio`: what can it do for me?

1. Predictions

for a huge number of observables (flavour physics, electroweak precision observables, Higgs physics, ...)

- **Standard Model** predictions (with uncertainties)
- Predictions in the presence of **new physics** (parametrized by Wilson coefficient in Weak Effective Theory (WET) or Standard Model Effective Field Theory (SMEFT))

2. Likelihoods

Combining predictions with experimental data contained in `flavio` allows constructing likelihoods

- Likelihoods in parameters (e.g. CKM parameters) or Wilson coefficients
- Use approximations for **fast likelihood** estimates
- `flavio` is the basis for the `smelli` global SMEFT likelihood Python package [arXiv:1810.07698]
- Use external fitters to perform Bayesian or frequentist statistics with `flavio` likelihoods
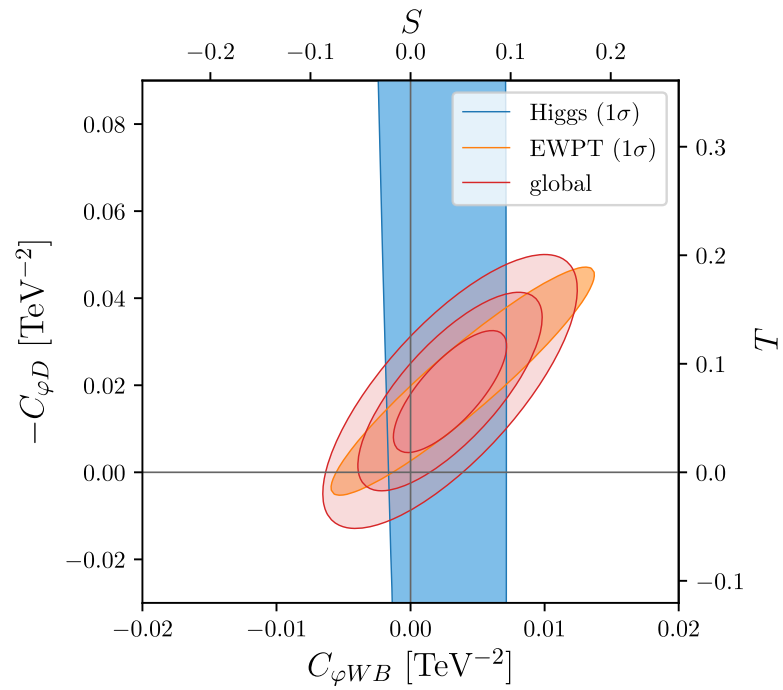
3. Plots

- Visualize experimental measurements & theory predictions
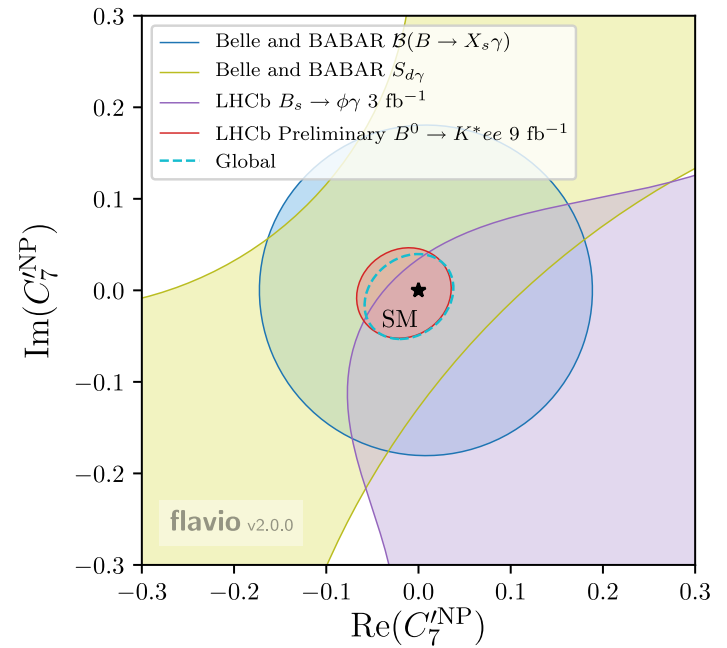- Visualize your likelihoods

Showcase
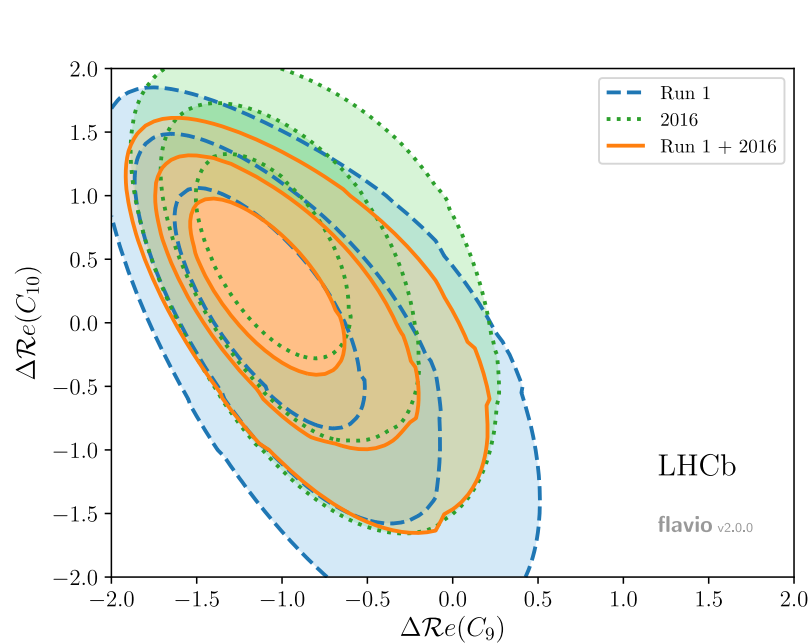
New physics in B-decays in WET and SMEFT Wilson coefficients
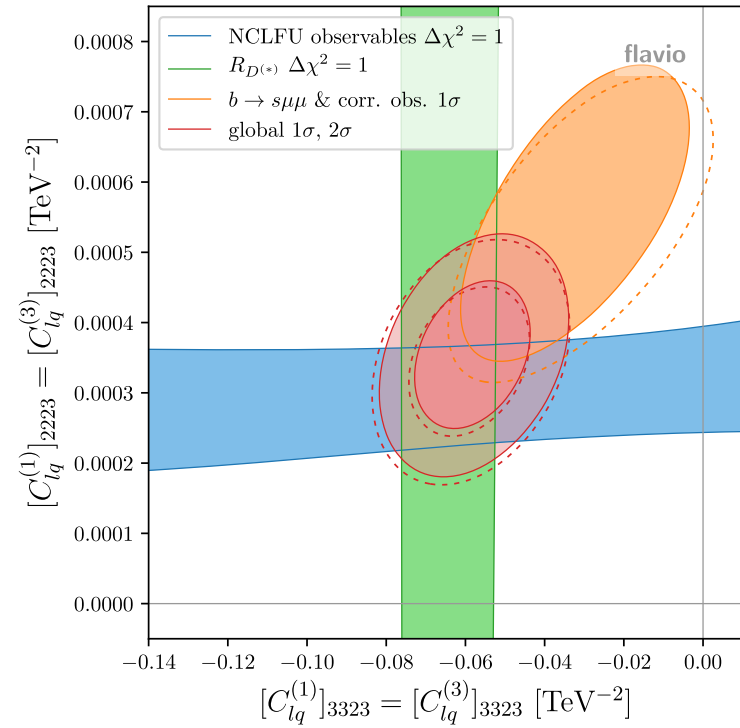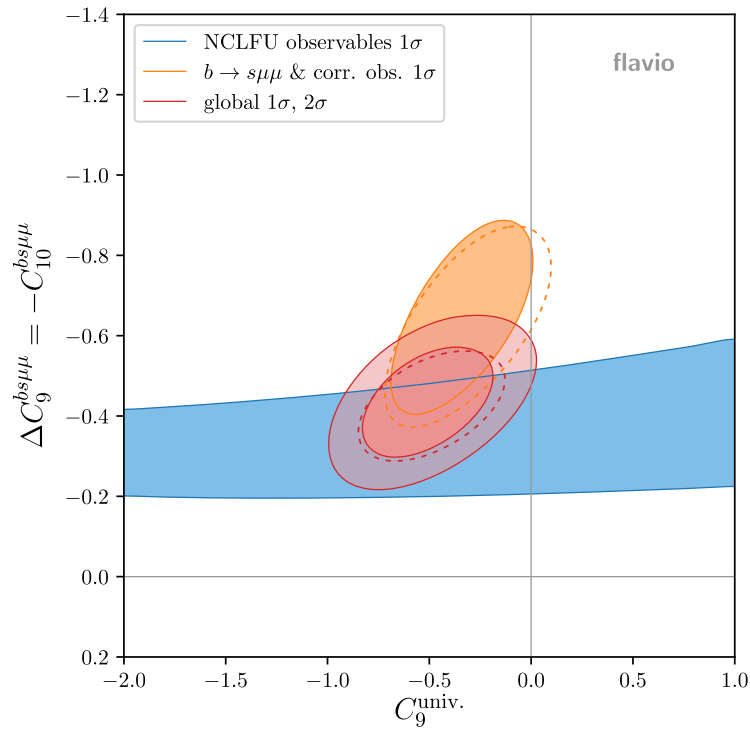
S-T fit using combined Higgs and electroweak likelihood (arXiv:1911.07866)

Fits to new physics Wilson coefficients from recent LHCb analyses

(LHCb-PAPER-2020-002 and LHCb-TALK-2020-155)

`flavio` is an open source project

- community developement at https://github.com/flav-io/flavio
- written in Python
- emphasis is put on making `flavio` easy to update and extend

`flavio`: hands-on project

In the hands-on projects, participants

- will learn how to update, extend, and improve `flavio` according to their needs,
- will work on small projects supervised by the current maintainer of `flavio`,
- are strongly encouraged to **suggest their own small projects** (e.g. observables or features they would like to be implemented in `flavio`).

Possible projects include:

- update experimental data included in `flavio`
- implement new observables (e.g. of the decays $\Lambda_b \to \Lambda(1520)ll$, $B_c \to J/\psi l\nu$, etc.)
- adding new features (e.g. import experimental likelihoods from ROOT files)
- your own ideas!

Getting started with `flavio`:

- Online documenation: https://flav-io.github.io/docs
- Lecture on `flavio`
    - watch video recording: https://bit.ly/3HyGvZB
    - start interactive slides: https://bit.ly/2G60WSs (try out the examples!)
    - download interactive slides from GitHub and them run locally:

        https://github.com/peterstangl/flavio-lecture
- Some experience with python will be useful

Participate in `flavio` hands-on projects

- Register at https://indico.in2p3.fr/event/25525/
- Initial meeting: Wednesday 17 November 14:00 - 16:00
- Projects will continue online
- Mattermost channel: https://mattermost.web.cern.ch/gdr-inf/channels/flavio-projects

Project coordinator: Peter Stangl (stangl@itp.unibe.ch)