Belle II pyhf Workshop: Q & A

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Bundesministerium
für Bildung
und Forschung

Belle II

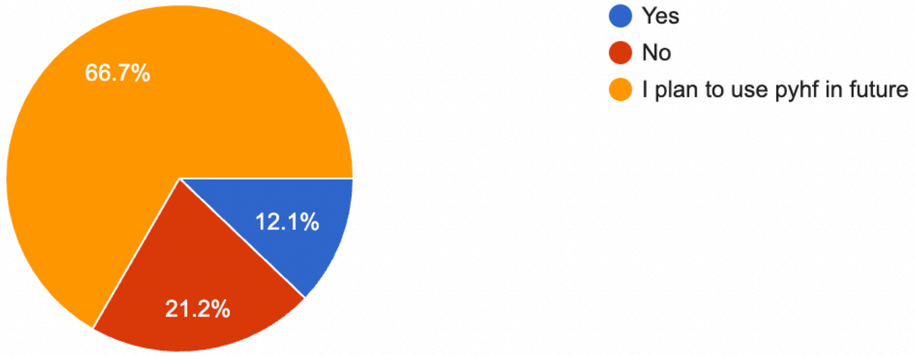
Karlsruher Institut für Technologie

Institut für Experimentelle Teilchenphysik

Belle II questionnaire: Basics

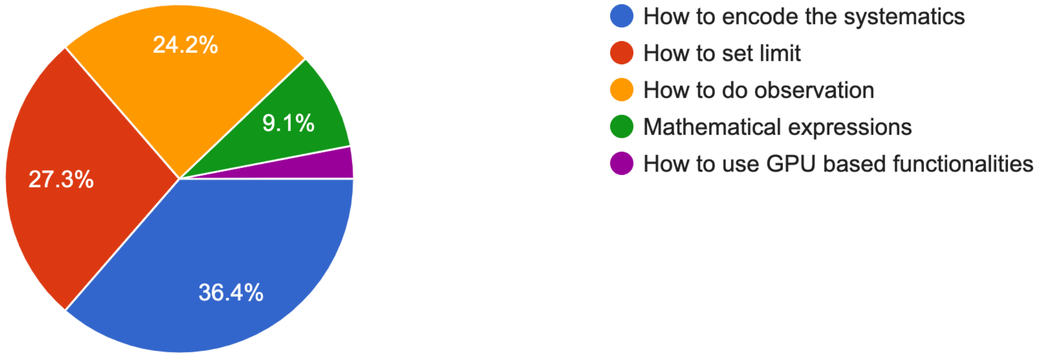
Do you use *pyhf* for your binned fits?

33 responses



What would you like to definitely see in pyhf tutorial?

33 responses



Belle II wants to

- Use the pyhf tools now and in future
- Wants to use it for both searches and precision measurements
- Learn how to encode systematics

Belle II questionnaire: Why not used yet?

Not needed until now, but big curiosity :)

If you answered "no" in the previous section, please specify why?

7 responses

Discovered it too late in analysis, switching too cumbersome

I have recently heard of pyhf but have yet to use it in my analysis. I want to learn more about it to use it in the future.

I'm not familar with "pyhf"

Never had to need to but I'd like to get more familiar with fits

Never had a chance to do that. I wish to learn more about it.

There are no specific motivations to use until now.

I do not know about it

Belle II questionnaire: Physics Reach

If you answer "Yes" or "I plan to use *pyhf* in future", in which analysis are you / will you use *pyhf*?

13 responses

Upper limit analysis

B0->tau tau analysis with Belle II data (WG1(leptonic), WG2(penguin) related topic)

Not sure yet

Exclusive charmless semileptonic

I'm working on BtoKtaue (CLFV) and starting a guessing it will be useful to know

LLP dark matter search, unsure if I will need pyhf but I am

Untagged B to DstEllNu

In R(pi)+R(rho) analyse by template fit to Eextra.

B->Knunu

Depends on functionality of "pyhf"

B -> K*0 tau tau and B -> K nu nu (had-tagged)

tau lifetime measurement using a template fit

Search for HNL at Belle

Belle 2, B->Knunu

Used / will be used across many different physics topics

- Semileptonic and leptonic decays
- Electroweak penguins
- Dark searches
- Charmless physics
- Tau physics

Belle II questionnaire: Q & A

1. Rough code structure of pyhf (very broad overview, just to get started if one wants to contribute).
2. I would like a tutorial for beginners
3. The foundation + implementation of the most important statistical tests

Tutorial on pyhf - basic use *Lukas Heinrich*

09:20 - 10:00

How to get involved in pyhf development *Matthew Feickert*

16:05 - 16:25

Live hackathon session

16:25 - 17:55

Belle II questionnaire: Q & A

4. Can you tell us about fit validation tools (toys, likelihood scans, etc)
5. What are the differences with respect to HistFactory
6. When I use pyhf.infer.hypotest with toys, is there any way to skip a failed toy? Does pyhf give correct result always? I mean, are there any areas of exclusion where pyhf does not behave properly?
7. How one does encode fit correlated variables?
8. How to use pyhf to set limits while scanning 1 or 2 parameters (for example: mass, width of new particle)?
9. Actually besides encoding systematic and setting limits also some example with calibration of background components would be useful. I mean if it possible to fit background only hypothesis in this framework, to obtain scale factors for bkg components, with uncertainties, which take into account uncertainties of MC and DATA templates?

What would Belle II users like to have implemented?

1. Arbitrary functional constraints between parameters would be awesome
2. Combining of several histograms of different observables with the same events to have more number of bins and incorporate more details is supported in pyhf? Or is it rather ill-defined task and it can be realized in different way by pyhf?

Please ask your questions now :)