PHYSTAT-Flavour

Organisers: O. Behnke, H. Dembinski, M. Kenzie, L. Lyons, D. Tonelli
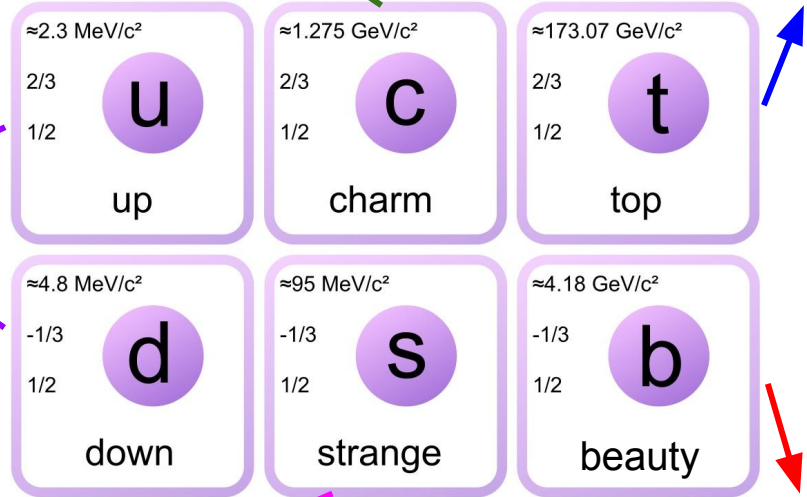
Thank you for attending and a special thanks to all speakers!

Charming Speakers

Top Questions

Up and down internet connection

Strange organisers

Beautiful audience

≈2.3 MeV/c² 2/3 1/2 **u** up	≈1.275 GeV/c² 2/3 1/2 **c** charm	≈173.07 GeV/c² 2/3 1/2 **t** top
≈4.8 MeV/c² -1/3 1/2 **d** down	≈95 MeV/c² -1/3 1/2 **s** strange	≈4.18 GeV/c² -1/3 1/2 **b** beauty

PHYSTAT-Flavour
scb
2020

PHYSTAT-Flavour-2.0 (2021)

- Current pandemic forced us into a remote only meeting
- Discussion is always easier in person (especially if there's a bar open)
- We plan a follow up meeting **in person** (hopefully in 2021)
- This meeting has served as a nice flavourful appetizer (β-version) which gives us some topics to think about before then

Sequels that were better than the original?
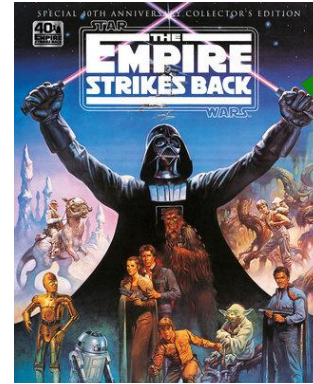
A few things to think about for next time 1/3

- The common theme seemed to emerge as the treatment of systematics
  - Systematic uncertainties should not be unnecessarily conservative (1σ should still be 68%)
  - Care about average coverage over a number of trials

- FC-like interval estimation and treatment of nuisance parameters
  - i) Plugin (profiled), ii) Gaussian sampling, iii) Berger-Boos, iv) Cousins-Highland?
  - Is there a consensus on the most appropriate treatment

- Keep theory systematics separate
  - Give conditional limits

- Limit setting
  - CLs favoured at CMS / ATLAS
  - FC favoured at B-factories
  - Is LHCb the Florida (swing-state)?
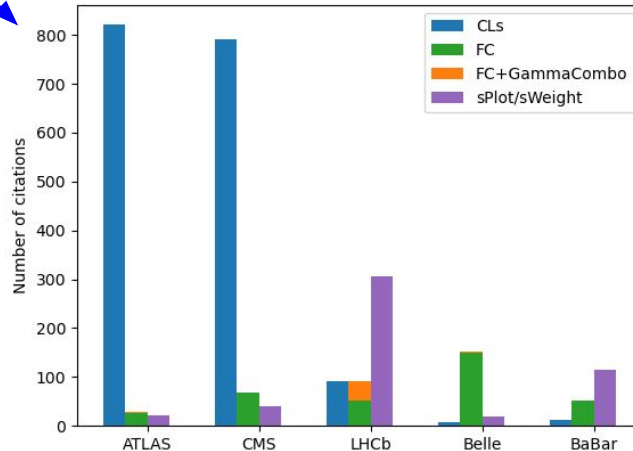
Common in flavour
Less-common (over-coverage?)
Sporadic in flavour (over-coverage?)
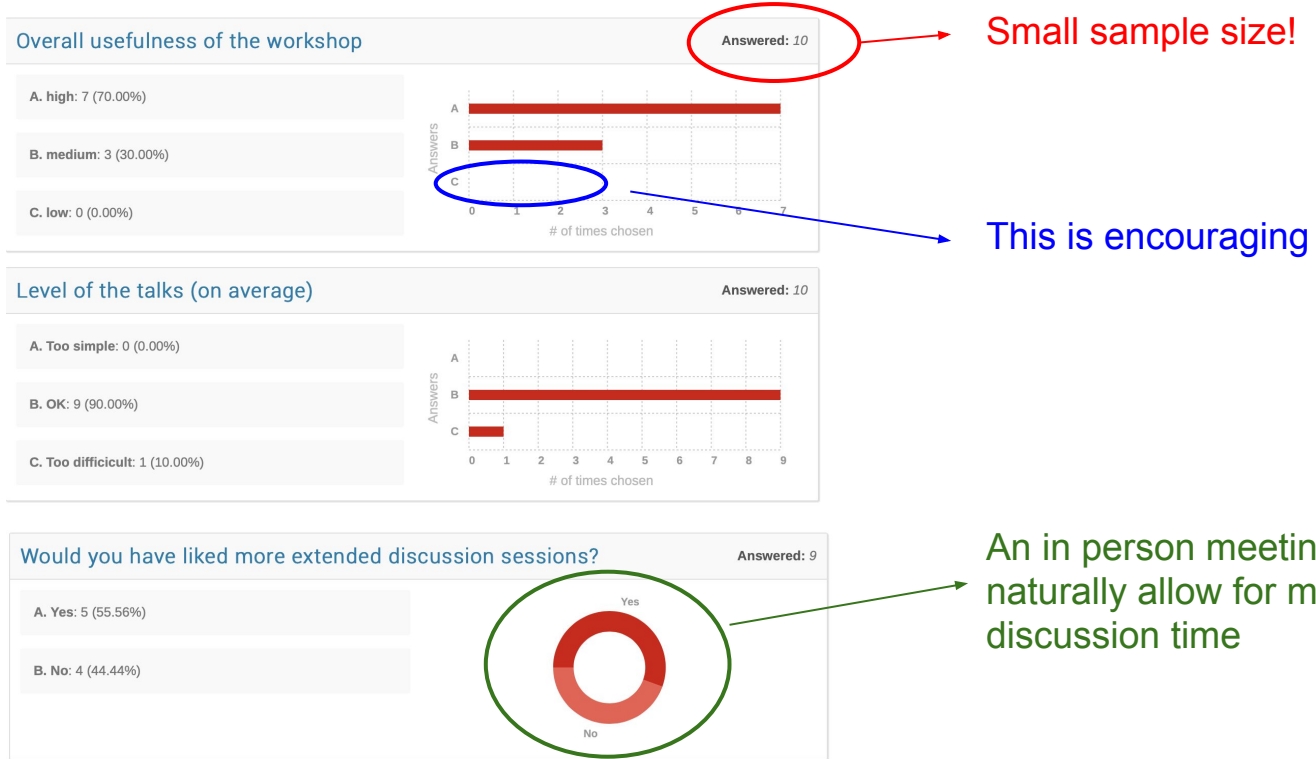Uncommon in flavour

A few things to think about for next time 2/3

- Why do we so rarely see direct comparisons between statistical methods?
  - Especially when far from the "asymptotic nirvana"
- Common formats for results?
  - Reduce "sloppiness" in some of our collaboration papers - statistical details are often glossed over or assumed
  - Can we agree of common nomenclature / use of terms to ease this?
  - We should be pushing for publication of likelihoods (tools like pyhf available)
- Uncertainties on uncertainties
  - In context of template morphing but also should averaging groups be considering this?
  - Possible alternative to artificial uncertainty scaling for inconsistent results?
  - Concerns about what distribution the uncertainty has
- Model adjustment and deviations in ND "Algeri method"
  - Can we actually try an implement Sara's ideas on a flavour-like example?
  - Extension to ND might be computationally difficult (Rosenblatt transformation)
  - What is the impact on the choice of information criteria?

A few things to think about for next time 3/3

- Lots of discussion on LEE
  - Think global → should you only quote **one** global significance
  - Is it possible / sensible to quote >1 global significance (Higgs discovery in 2 mass ranges)?
- Does bootstrapping have more applications?
  - Brad showed implementations in R (for a python implementation see https://github.com/resample-project/resample or `pip install resample`)
  - Implications of BCa (does it perform better than our standard methods for uncertainties e.g. MINOS / HESSE)?
- Fitting weighted data and using sWeights
  - Some new ideas and techniques introduced by M. Schmelling and C. Langenbruch but neither are yet widely used
- A few areas not discussed
  - Machine Learning tools / techniques
  - Computational improvements (fitting on GPUs)

Preliminary Survey Results

Overall usefulness of the workshop — Answered: 10

A. high: 7 (70.00%)

B. medium: 3 (30.00%)

C. low: 0 (0.00%)

Small sample size!

This is encouraging

Level of the talks (on average) — Answered: 10

A. Too simple: 0 (0.00%)

B. OK: 9 (90.00%)

C. Too difficult: 1 (10.00%)

Would you have liked more extended discussion sessions? — Answered: 9

A. Yes: 5 (55.56%)

B. No: 4 (44.44%)

An in person meeting will naturally allow for more discussion time

Final Remarks

- Please do not forget to fill out the survey on the indico page:
  - https://indico.cern.ch/event/940874/surveys/1756
  - This will help us plan for the next workshop

- Thank you again for attending!

- Stay safe!

Goodbye and see you at PHYSTAT-Flavour-2!

"Data, data, data… I cannot make bricks without clay"
- Sherlock Holmes, The Adventure of the Copper Beeches