

Reproducible Science



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<http://mazurov.github.io/webfest2013/>

Problem



LHCb-ANA-2013-YYY
August 2, 2013
Version 0.4.1

Study of χ_b production at $\sqrt{s} = 7$
and 8 TeV

I. Belyaev^{1,2}, C. Bozzi³, H. Dijkstra¹, A. Mazurov^{1,4}.

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Abstract

A study of χ_b production at LHCb is performed on data collected during 2011 and 2012, by reconstructing $\chi_b(1P, 2P, 3P) \rightarrow \Upsilon(1S)\gamma$ decays. The differential production cross sections, relative to the $\Upsilon(1S)$, are measured as a function of $\Upsilon(1S)$ transverse momentum and rapidity. The $\chi_b \rightarrow \Upsilon(2S)\gamma$ and $\chi_b \rightarrow \Upsilon(3S)\gamma$ decays are also investigated. The $\chi_b(3P)$ mass is measured.

Sasha: I've finished my analysis note. Let's publish it!

Boss: How you got the results? How could I check it and reproduce???

Many questions

What dataset was used? Data taking conditions? Monte-Carlo simulation? Model and fit parameters? Software libraries? How you got these figures? How could I run your code?

????????????

**How can I share
computational
knowledge?**

Solution

- Link together experiment data and metadata:
 - Use all sensible information in version control systems (git, svn)
 - Tag analysis results by version number.
- Have interactive tools to present your results (master classes, hackathons, code labs, webfests ...)

Interactive tools

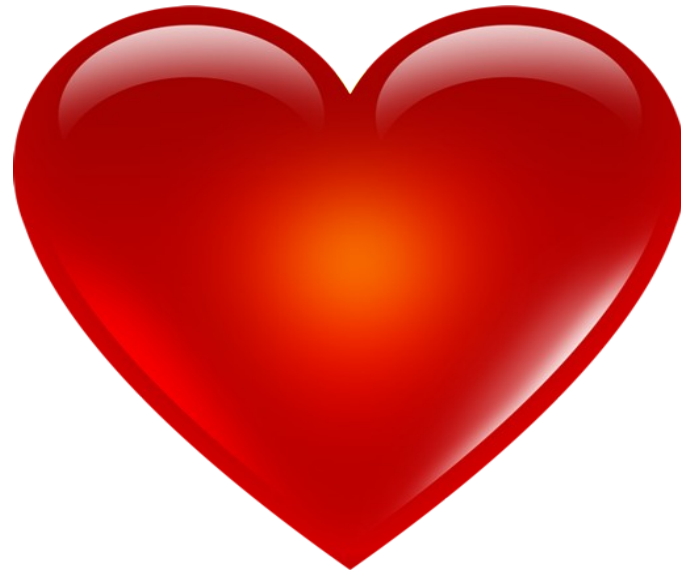
Web browser is the best tool to present results:

- You can run it on your computer, iPad, iPhone
- Can show multimedia objects
- Can run **interactive** applications

Main Analysis Tools at CERN

- ROOT [C++, CINT]
- Python
- PyROOT

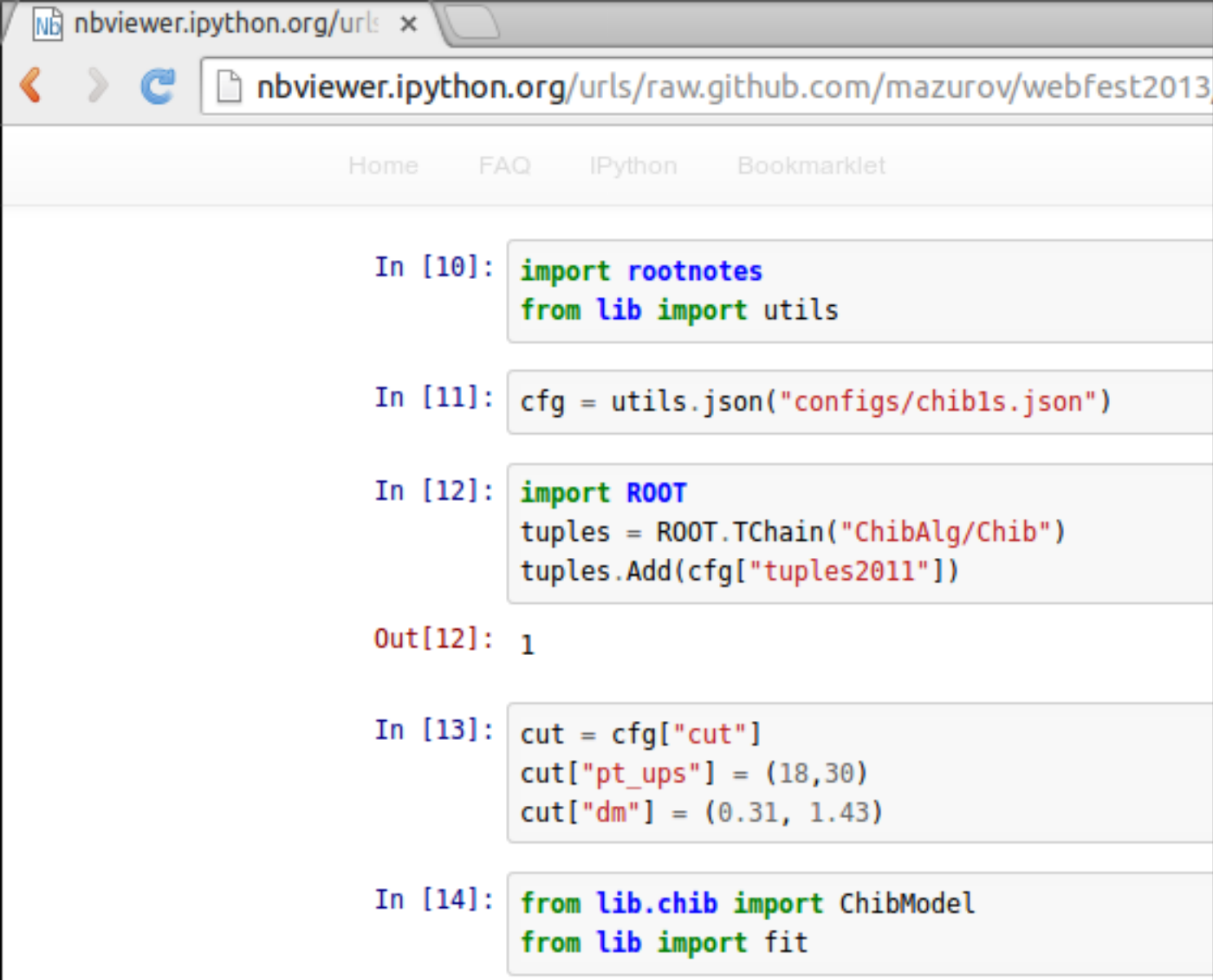
Web



ROOT



Interactive analysis in your browser



```
In [10]: import rootnotes
         from lib import utils

In [11]: cfg = utils.json("configs/chib1s.json")

In [12]: import ROOT
         tuples = ROOT.TChain("ChibAlg/Chib")
         tuples.Add(cfg["tuples2011"])

Out[12]: 1

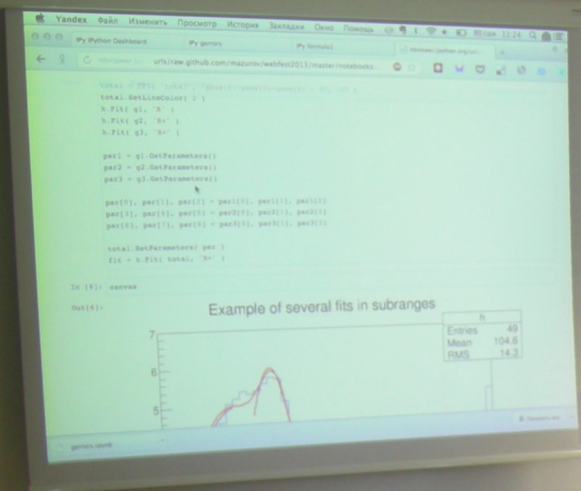
In [13]: cut = cfg["cut"]
         cut["pt_ups"] = (18,30)
         cut["dm"] = (0.31, 1.43)

In [14]: from lib.chib import ChibModel
         from lib import fit
```

Conclusion

This weekend:

- Released python package to display ROOT canvases in ipython notebooks.
- Held a master class on Sunday



Whiteboard with handwritten notes and diagrams.

Presenter standing at the front of the room.

Attendees seated at the table, looking towards the front.

Attendee in the foreground working on a laptop.

Attendee in the foreground working on a laptop.

Attendee on the right side of the room.

Next Steps

Link together experiment data and metadata

- Use all sensible information in version control systems (git, svn)
- Tag analysis results by version number.

Questions?