# Reproducible Science

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

# Problem

LHCb-ANA-2013-YYY
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Version 0.4.1

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

I. Belyaev[1,2], C. Bozzi[3], H. Dijkstra[1], A. Mazurov[1,4].

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**Abstract**

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

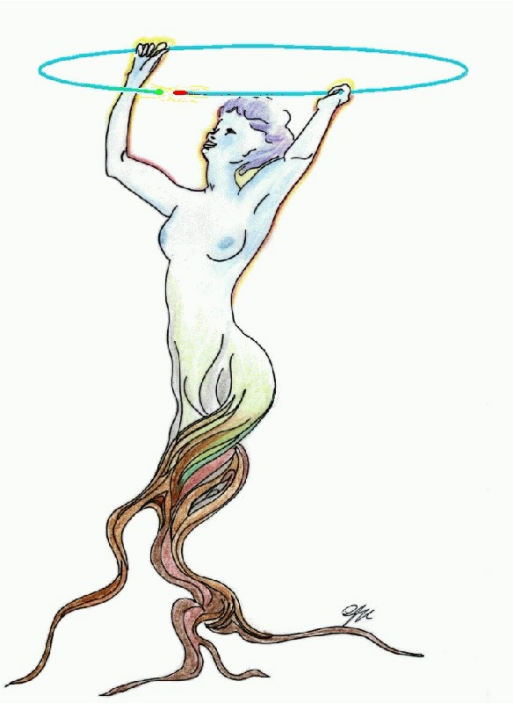
- You can run it on your computer, iPad, iPhone
- Can show multimedia objects
- Can run interactive applications

# Main Analysis Tools at CERN

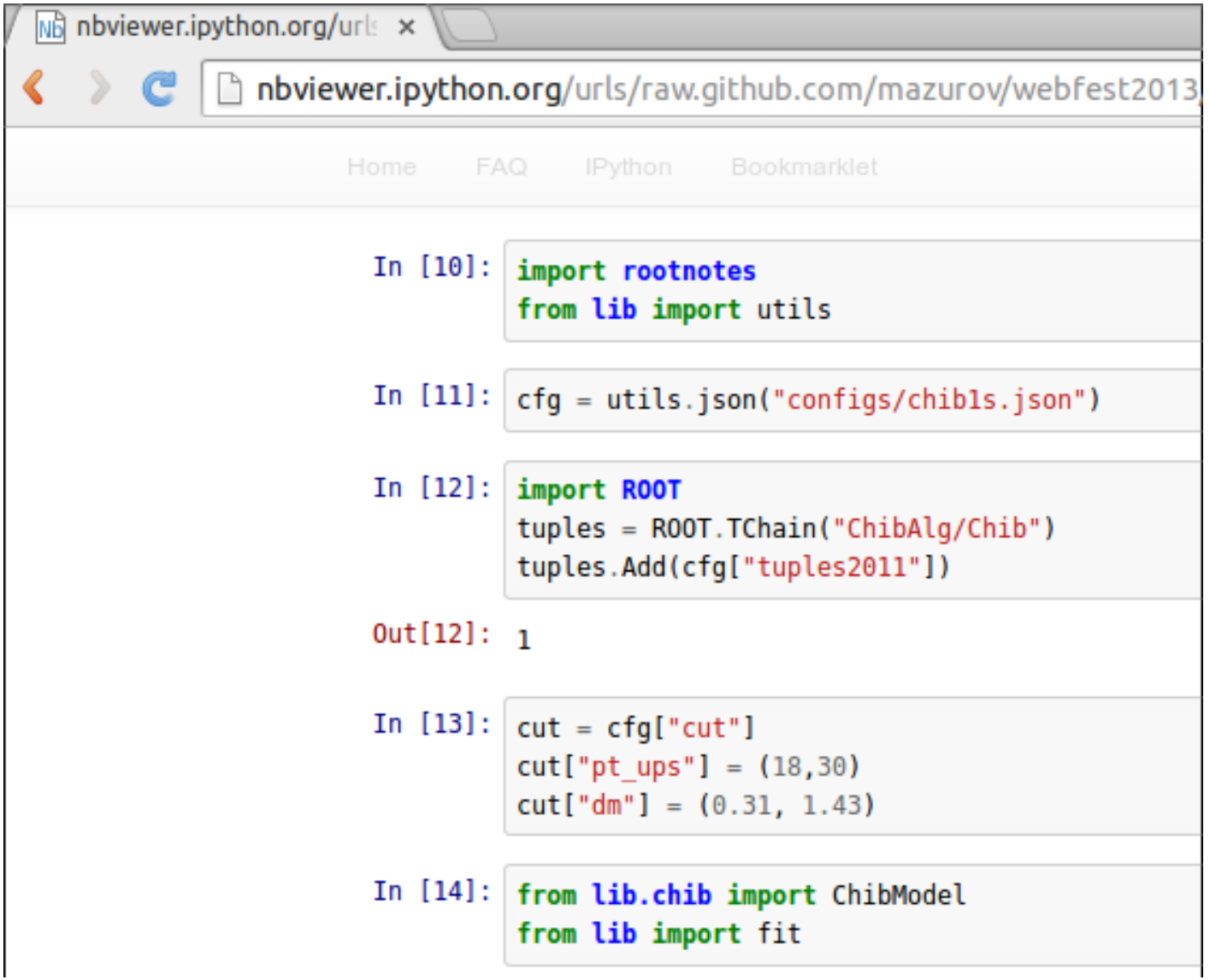
- ROOT [C++, CINT]
- Python
- PyROOT

# Web

# ROOT



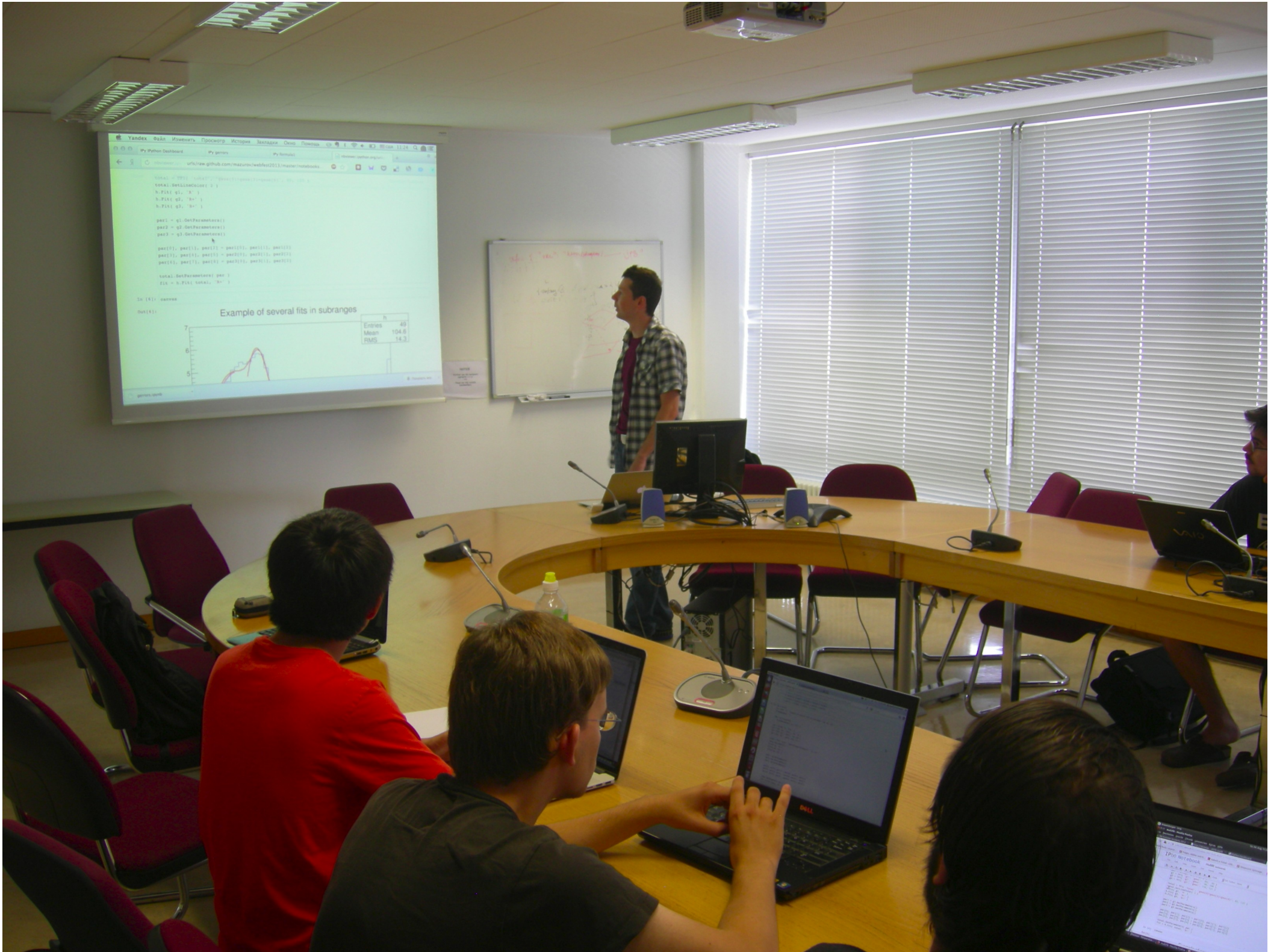
# Interactive analysis in your browser



# Conclusion

## This weekend:

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


Example of several fits in subranges
h
Entries 49
Mean 104.6
RMS 14.3

# 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?