LHCb opendata and outreach highlights.
Personal perspective.

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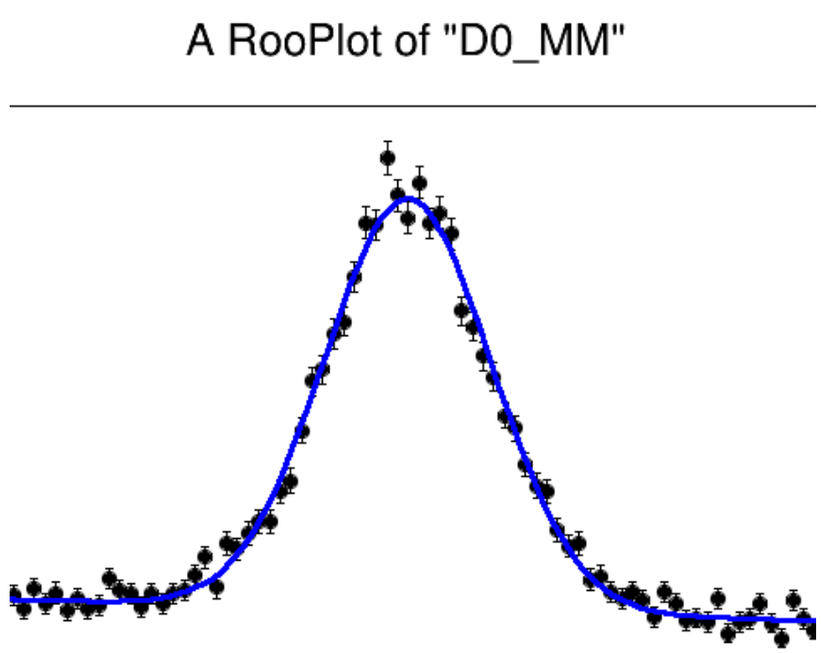
Example 1: D0-Masterclass

- Dataset:
  - $D^0 \to K^+\pi^-$
  - Format: root n-tuple
  - Year: 2010
- Masterclass
  - Goal: measure mass of D^0, lifetime
  - Target audience: high-school students
  - International event, several times a year

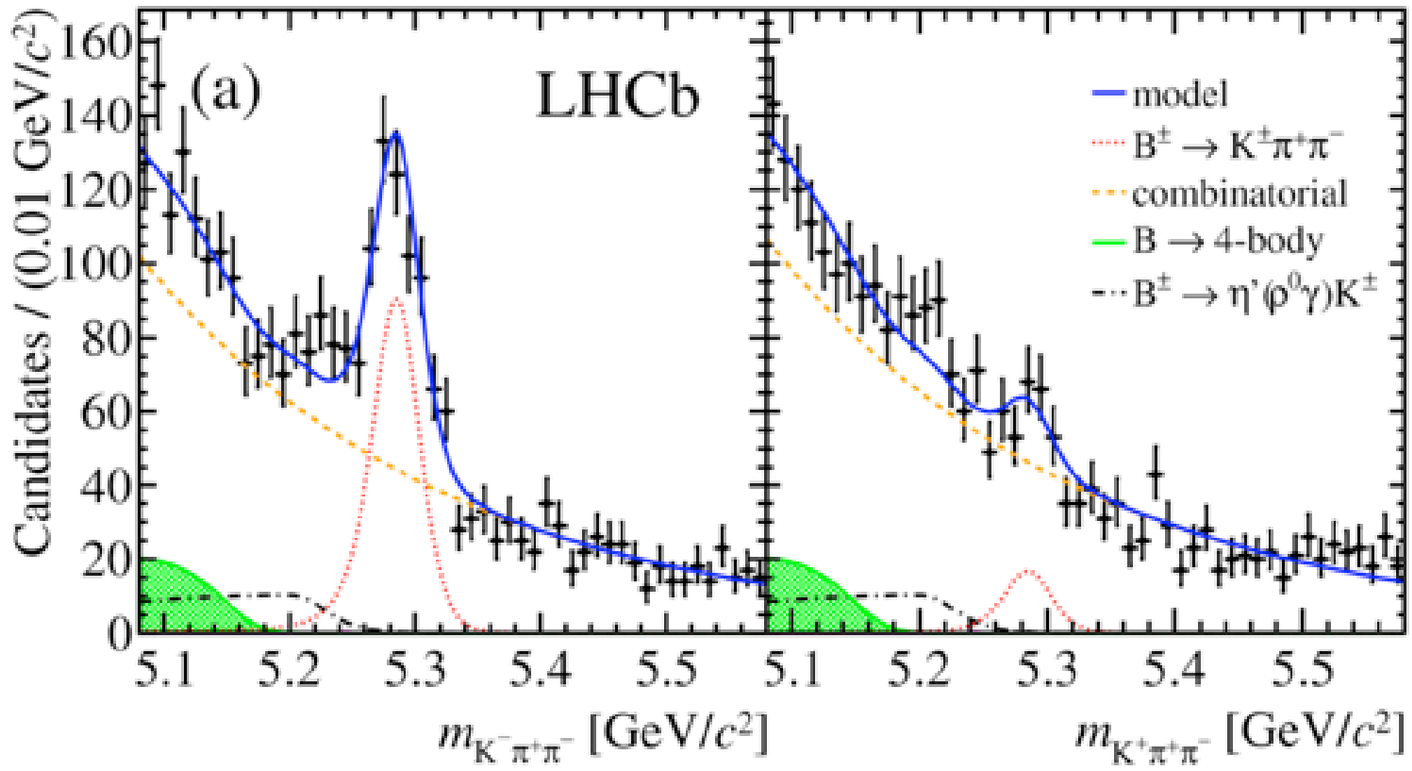


http://opendata.cern.ch/about/LHCb

Example 2: CP asymmetry

$$B^+ \to K^+\pi^+\pi^-$$

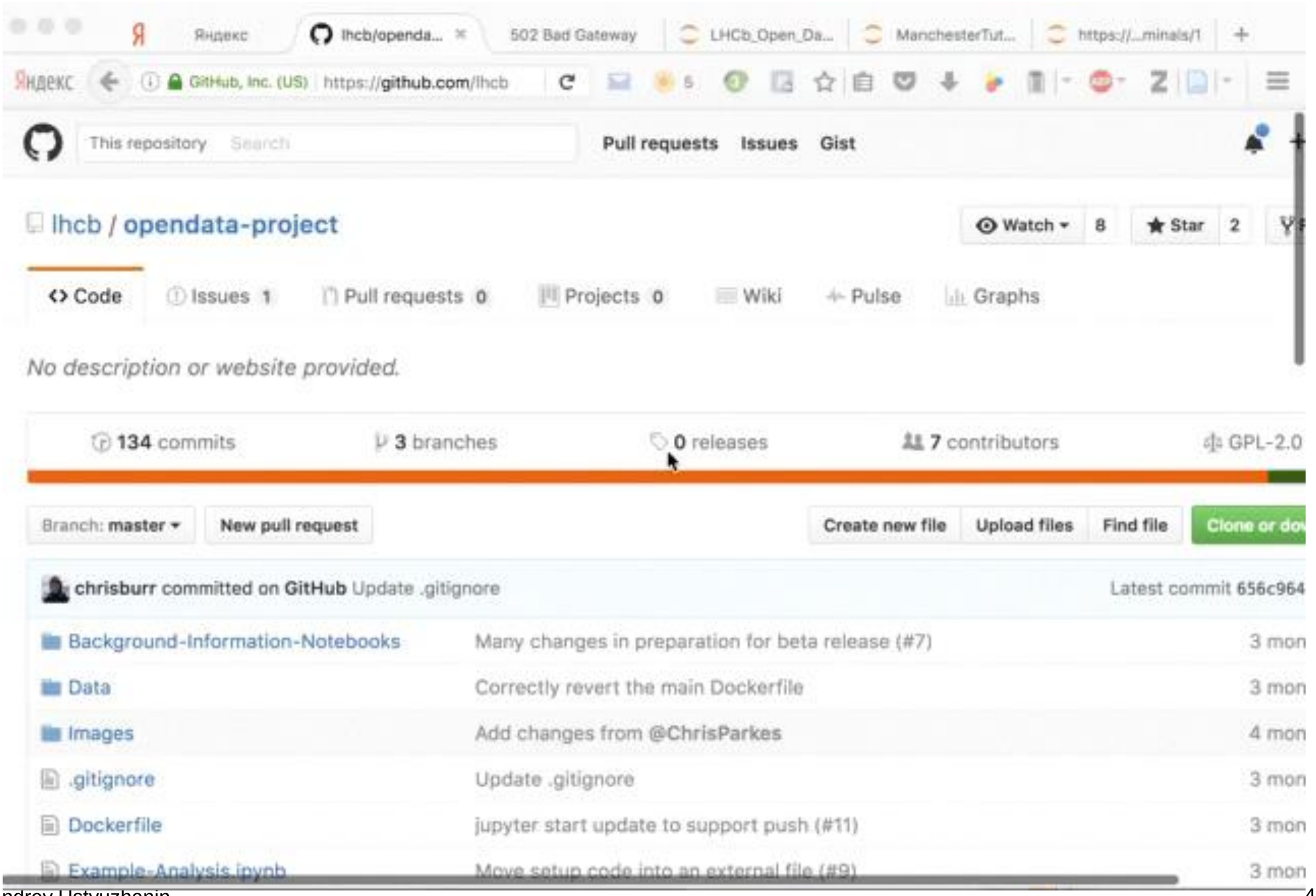
- Dataset:
  - 〉 Format: root n-tuple
  - 〉 Year: 2011
- Masterclass
  - 〉 Goal: measure CP violation
  - 〉 Target audience: Bachelor students, societies (astronomy)
  - 〉 Initially created by Manchester Uni



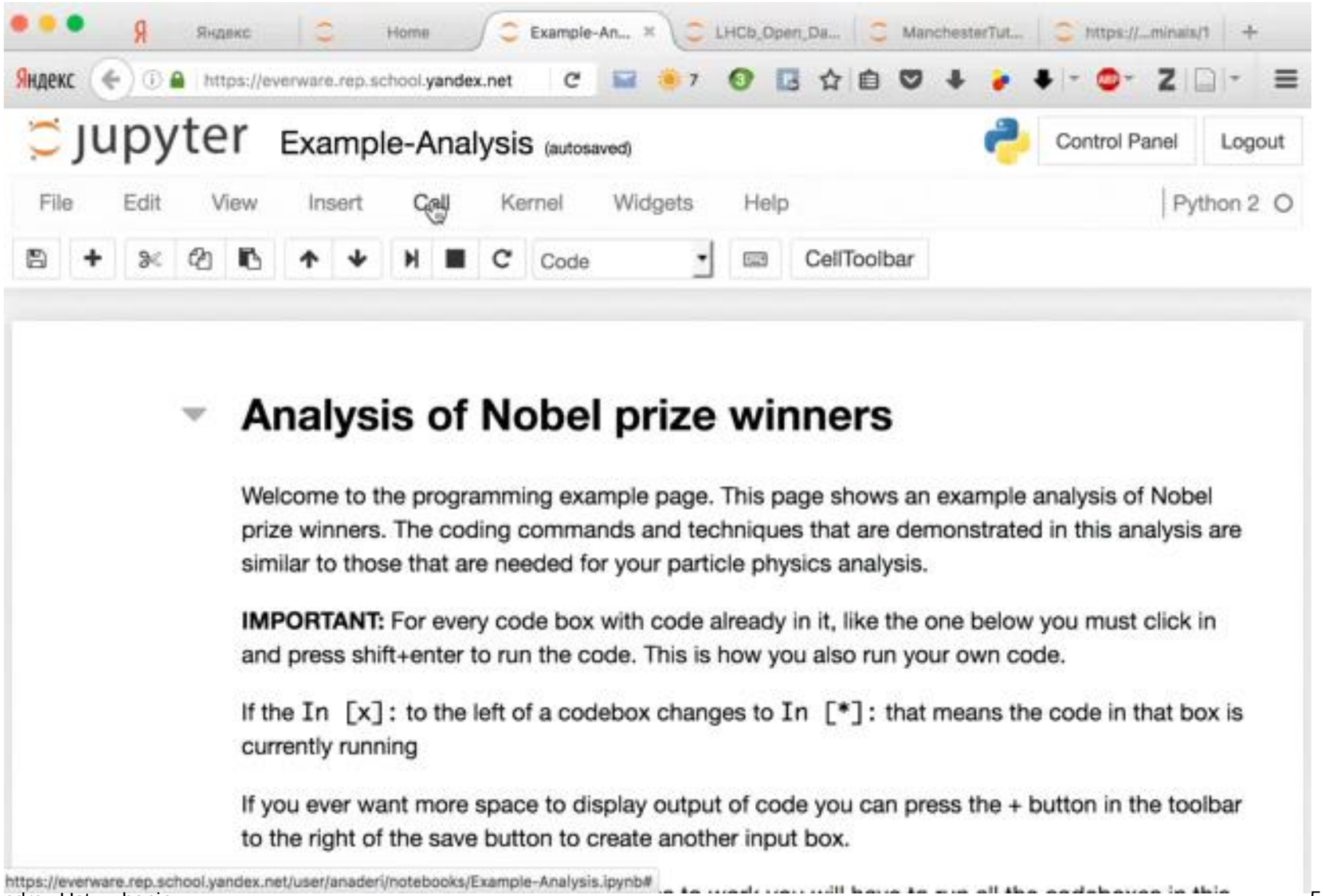
It used to take > 1 week to complete!

https://github.com/lhcb/opendata-project

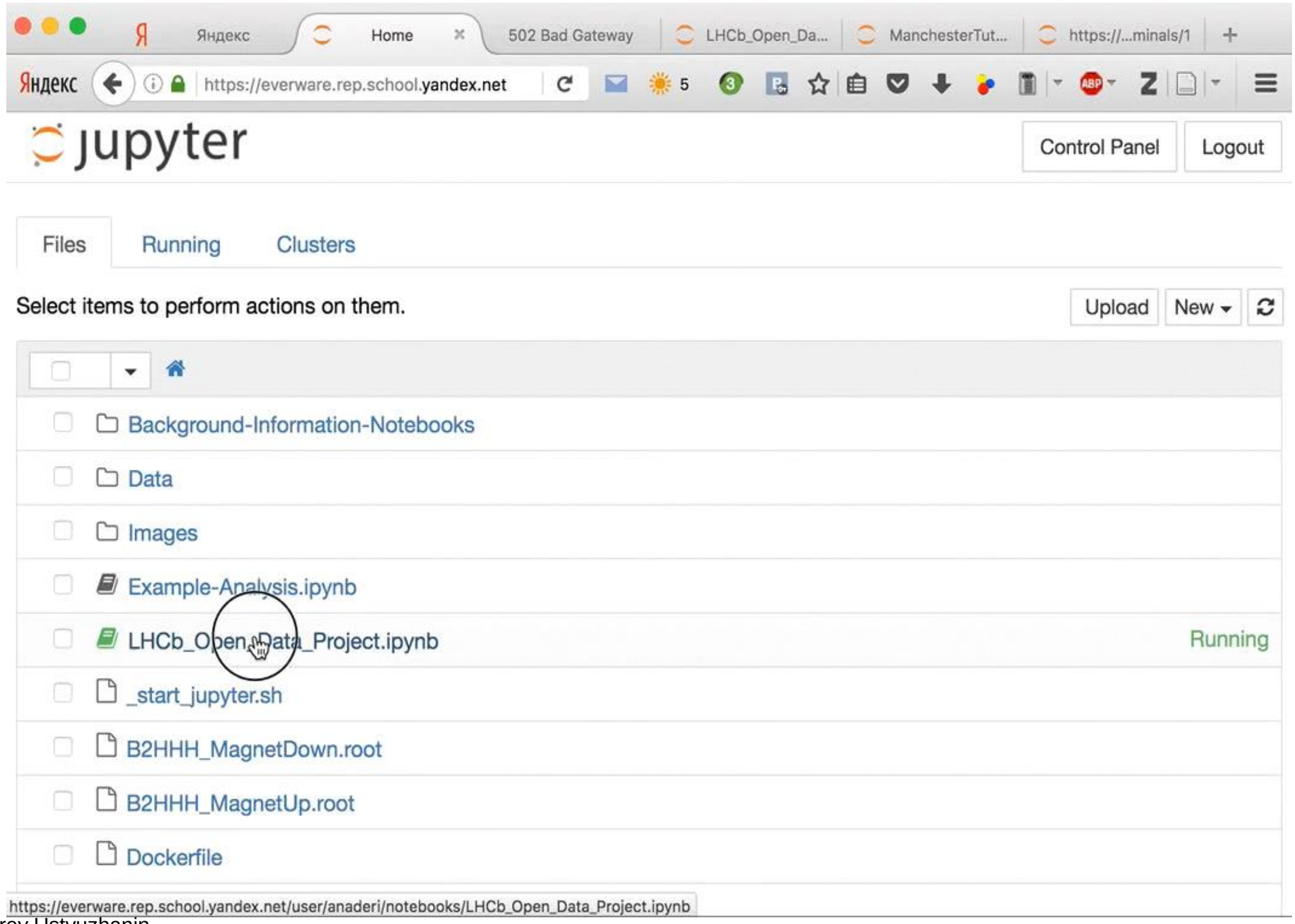
Starting Masterclass



Supplementary tutorial



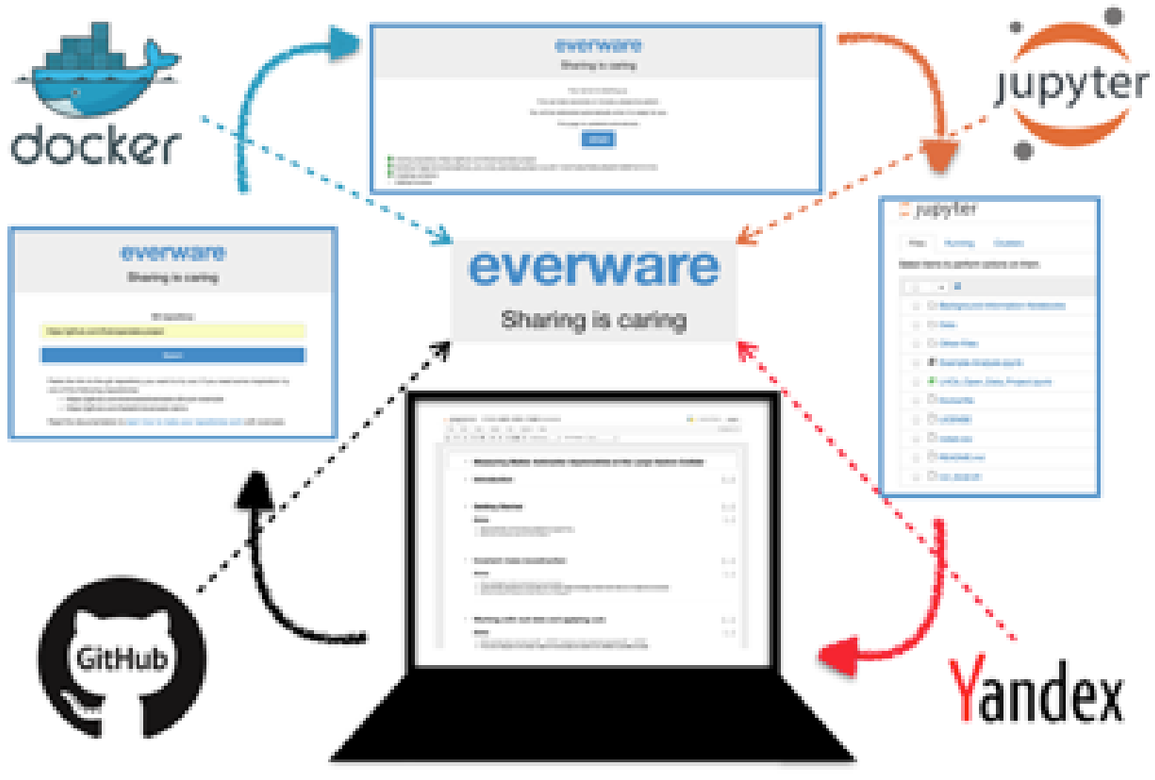
Interacting with notebook



Technological landscape

Entirely web-based

removes OS dependency,
user IT requirements



Hosted by Yandex

Jupyter Notebooks

〉 Instructions, hints, user cod

Docker

〉 Environment

GitHub

〉 Code storage

CERN open data portal

〉 Data (to appear, for the moment uses cernbox)

Everware

〉 Bridge between Github/ Docker/Jupyter

Example 3: Web-based Event Display

LHCb:

https://lbevent.cern.ch/EventDisplay/index.html

Other experiments:

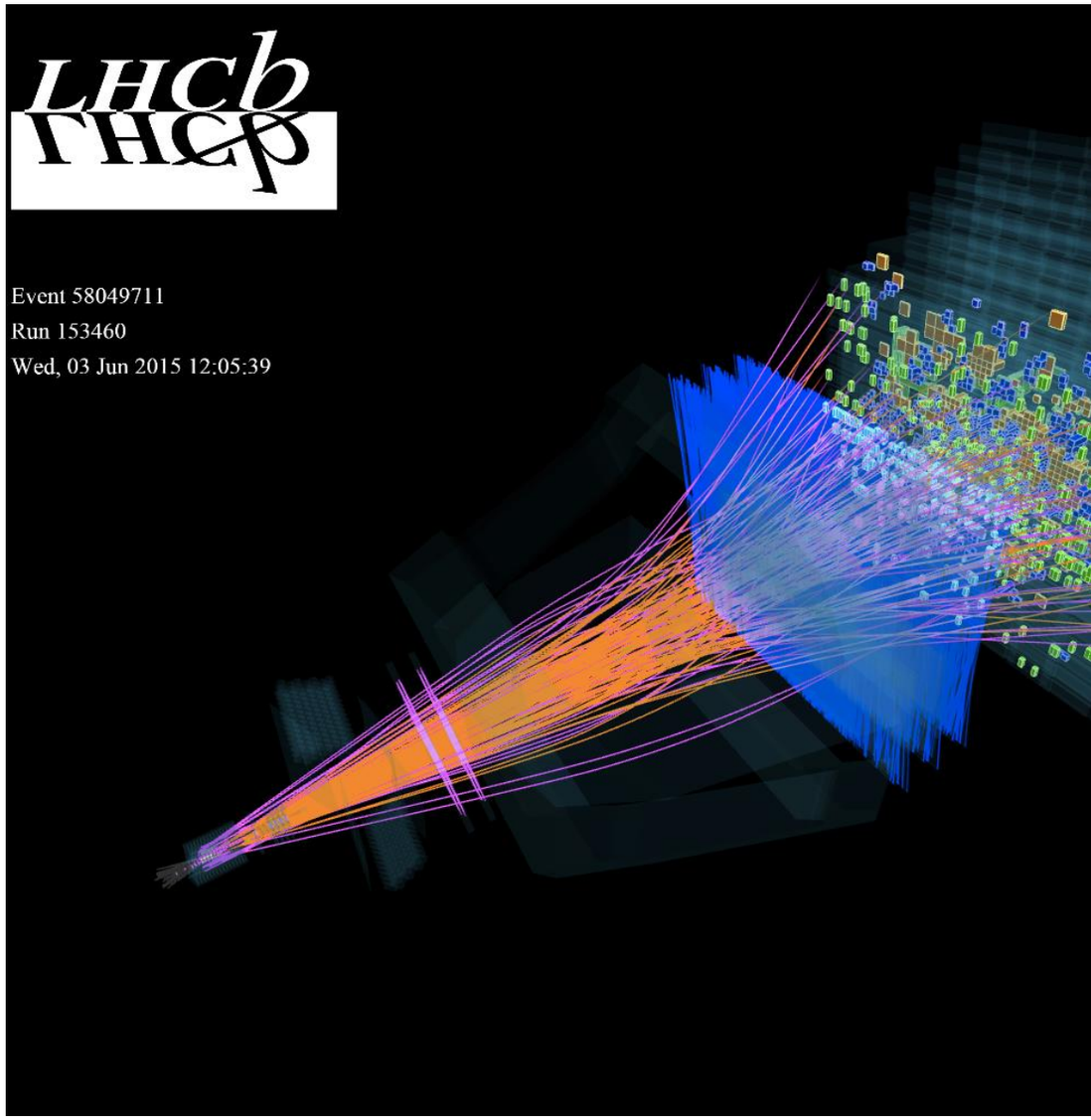
http://atlas.cern/atlas-live

http://mcmstv.web.cern.ch/mcmstv/#home

http://cern.ch/ispy-webgl

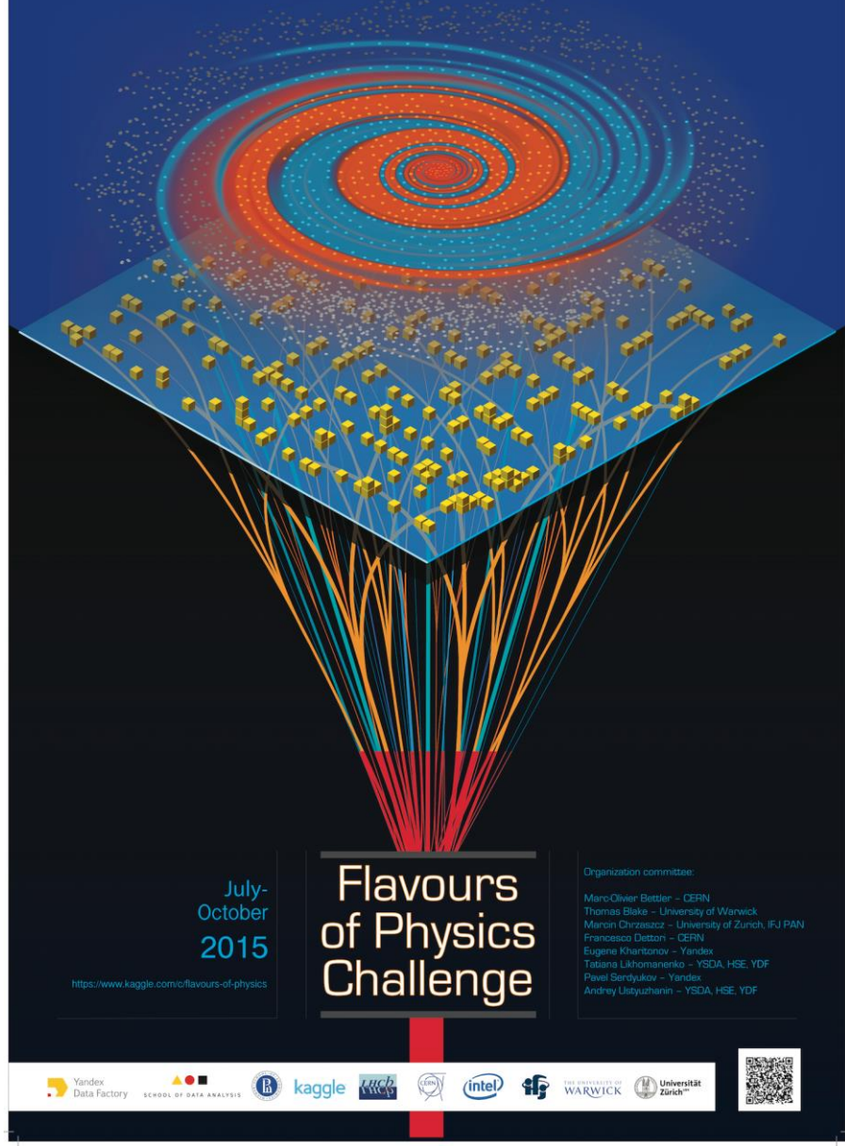
Technologies:

〉 Javascript, WebGL, Unity, …



Example 4: $\tau \to 3\mu$

- Dataset:
  - $D_s \to \varphi\pi$, $\tau \to 3\mu$, MC (Simulated)
  - Format: CSV
  - Year: 2012
- Challenge
  - Goal: design algorithm looking for $\tau \to 3\mu$,
  - Target audience: data science students, ex physicists,
  - International challenge: 2015,
  - Complex metrics,
  - Interesting solutions, outcomes.



https://www.kaggle.com/c/flavours-of-physics

Conclusion

- Formats of interaction vary in wide range
  - Event display,
  - Interact with root files using ROOT
  - Interact with root files using Python
  - Challenge(s)
- Every format takes considerable of efforts
  - Technological,
  - Administrative,
  - Marketing (main audience driver!)
- Other LHC experiments have plenty of useful experience (CMS)

Thank you for attention!

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