ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

International Conference on High Energy Physics,
4-11th Jul 2018, Seoul, South Korea

LUCA PESCATORE on behalf of the LHCb collaboration

STATUS OF OUTREACH ACTIVITIES AT LHCB

LHCb on the web

Very active on the web!

Public home page: info about the detector, CERN and news.

lhcb-public.web.cern.ch

Twitter

twitter.com/LHCbExperiment/

~23.6k followers

Facebook

facebook.com/LHCbExperiment

~12k likes and ~12k followers

Instagram

instagram.com/lhcbexperiment/

~2.5k followers

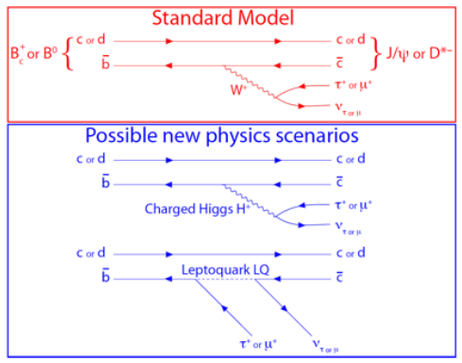
On average weekly news about events and new results reported in a style for a general audience.

LHCb on the web

13 September 2017: First test of lepton universality using charmed-beauty meson decays.

Measurement of R(J/ψ): the ratio of branching fractions between $B_c^+ \to J/\psi \tau^+ \nu_\tau$ and $B_c^+ \to J/\psi \mu^+ \nu_\mu$ using $\tau^+ \to \mu^+ \nu_\mu \bar{\nu}_\tau$ decays.

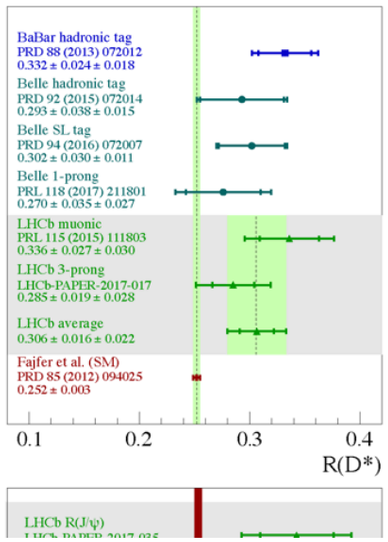
[R(J/ψ) = 0.71±0.17±0.18]



Today, at the open LHCC, the LHCb col measurement of th $B_c^+ \to J/\psi \tau^+ \nu_\tau$ and result that was rep the Standard Mode about 3 standard d beauty mesons incl

This result must be tests of so-called "l from the fact that i muons (μ), interact language, have the between various le when performing c is much heavier tha for the ratio R(J/ψ)

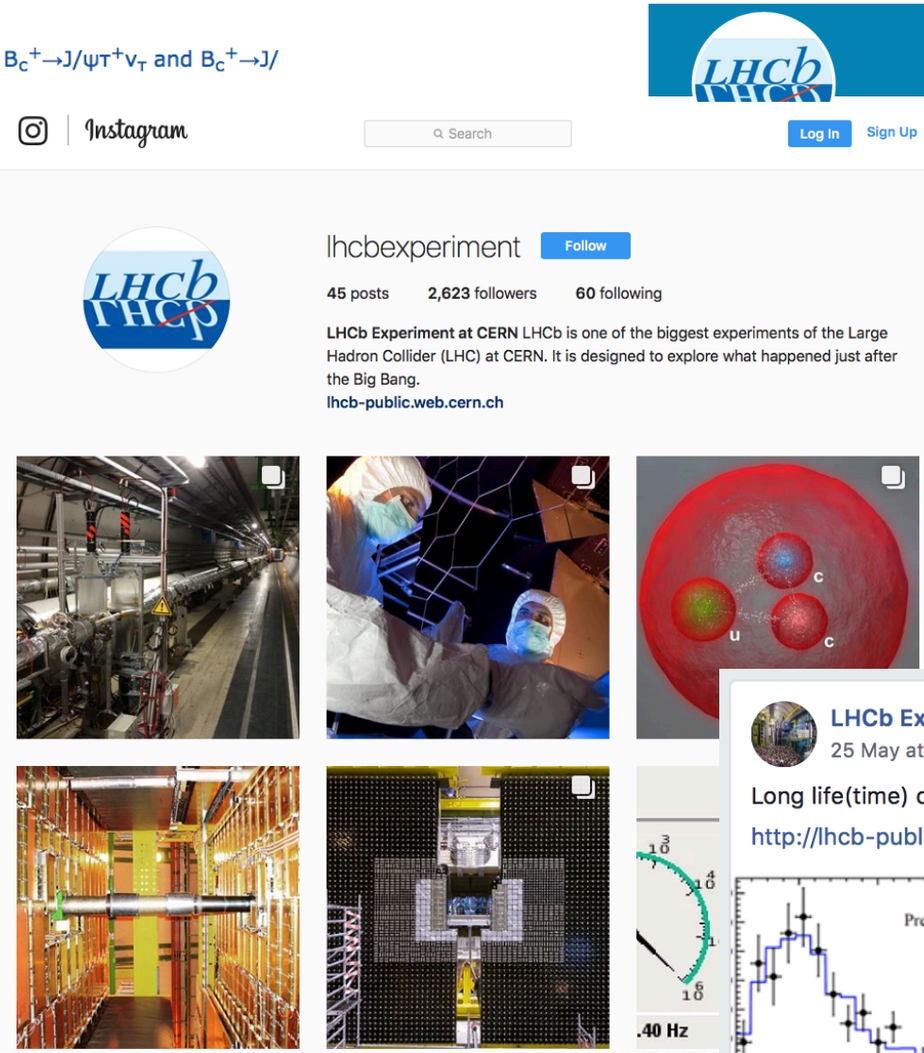
and 0.28.

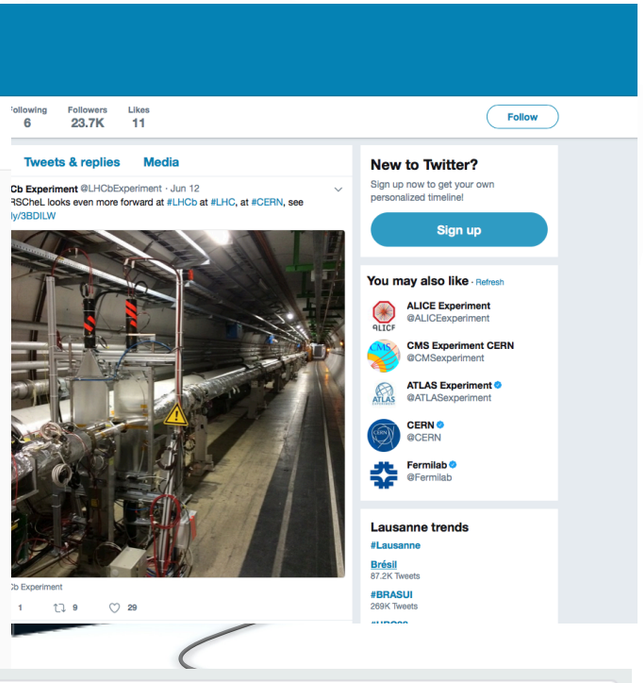


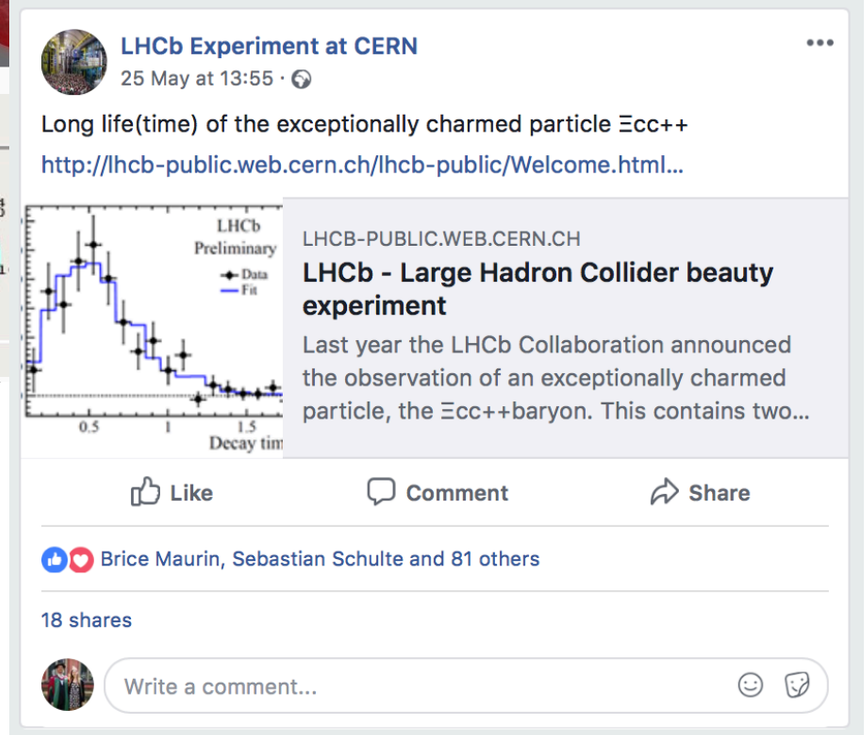
A programme of meas leptons in the final sta Belle collaborations. T R(D*), the ratio of bra $B^0 \to D^{*-} \mu^+ \nu_\mu$, see the by a quark accompany visible in the image at diagram as for examp R(D*) and R(J/ψ) rati

The R(J/ψ) measurem leptons invisible in the leptons, are observed perfectly identified as μ is the key addition t leptons to be distingui

The left hand side ima as presented in the 6 different experiments Belle) colliders, using values systematically above the SM prediction. The value of R(J/ψ), 0.71±0.17±0.18, reported today and presented in the lower part of the image, is also lying above the SM prediction. (Note the different horizontal scale.)







On average weekly news about events and new results reported in a style for a general audience.

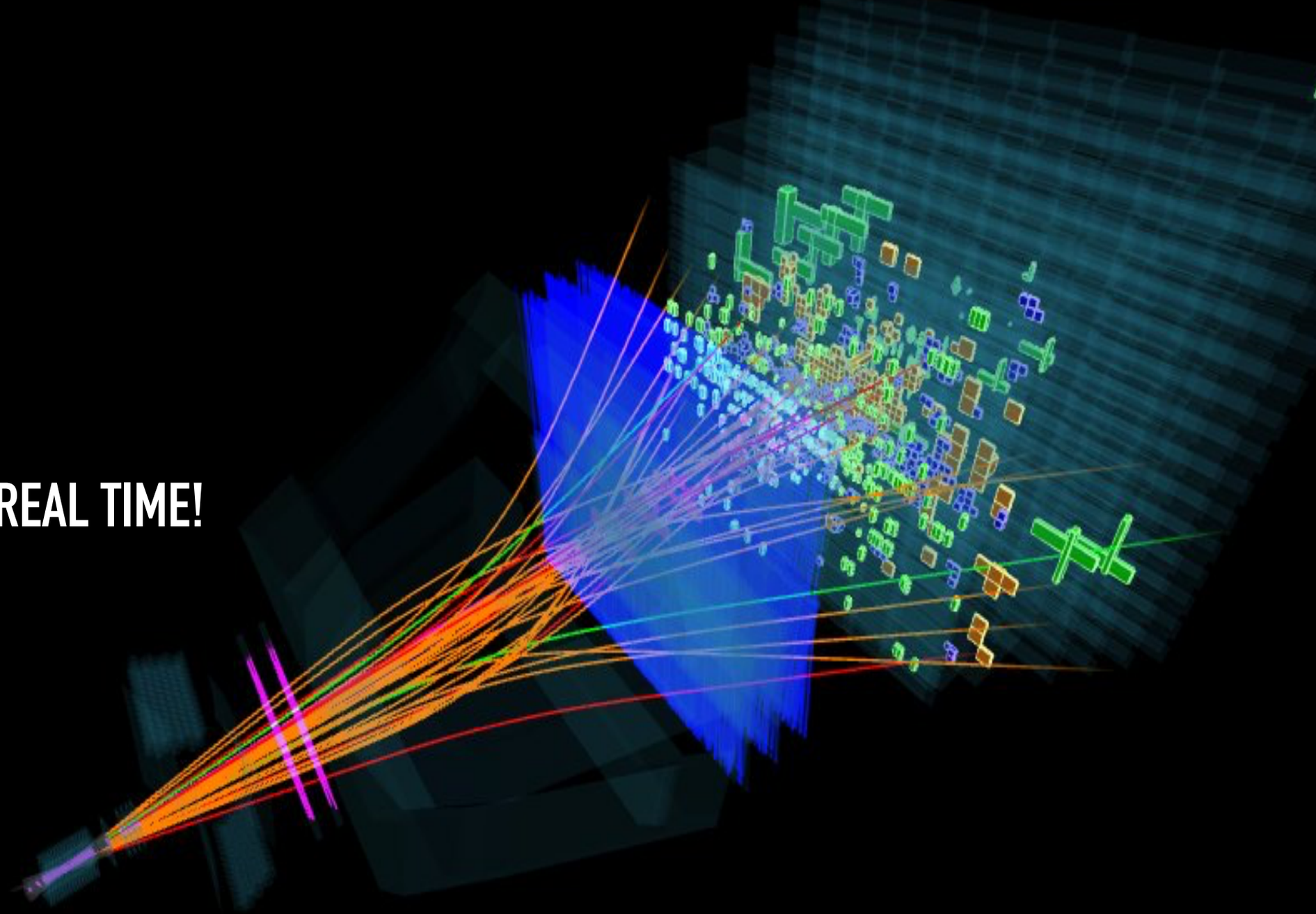
lbevent.cern.ch/EventDisplay/index.html

Event 158826354

Run 206854

Sat, 28 Apr 2018 21:48:17

SHOWS EVENTS IN REAL TIME!

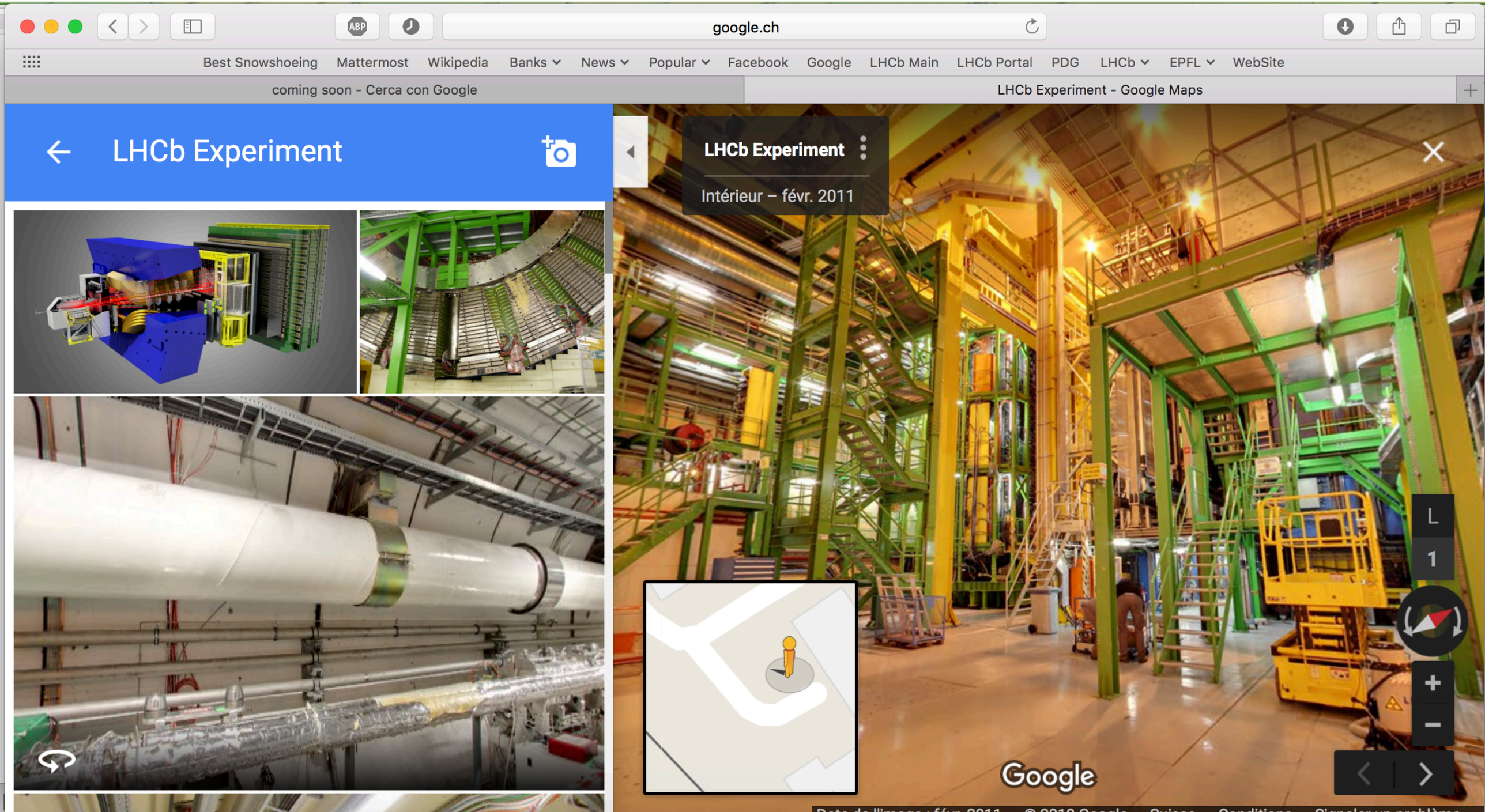


Very interactive: possibility to change colours, rotate with mouse, change visualisation parameters and download the event.

Different particles shown with different colours!

Virtual visits

The cavern is on Google StreetView and
we have two cameras in control room for virtual visits.



MASTERCLASSES

INTERNATIONAL MASTERCLASSES

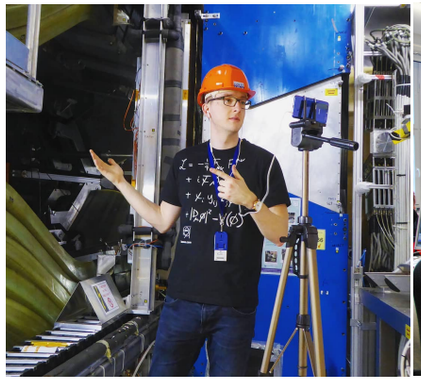
hands on particle physics

Discovery of Particle Physics for 15 to 19 year old students

Get an insight into topics and methods of basic research and the fundamentals on matters and forces…

2018 : 10 LHCb events, 34 institutes, 13 countries!

LHCb Masterclass Page

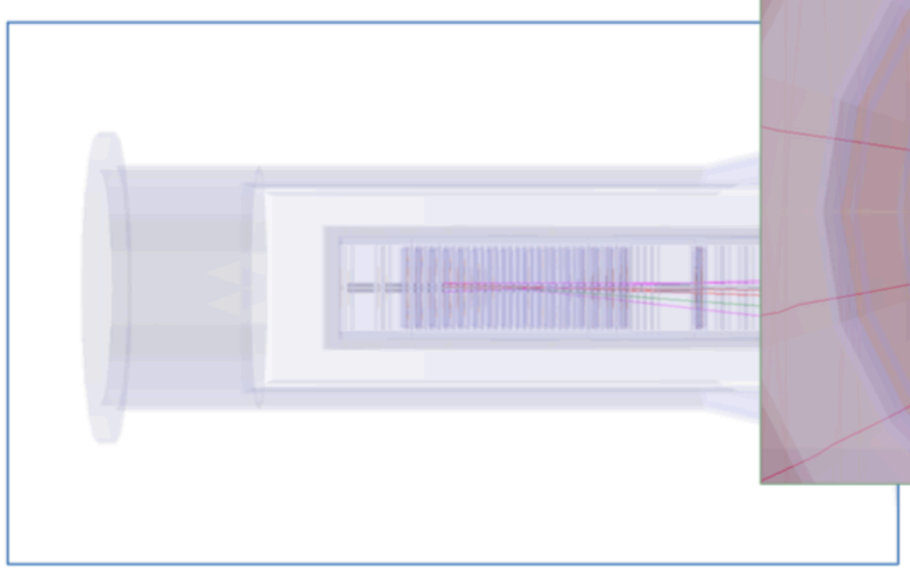


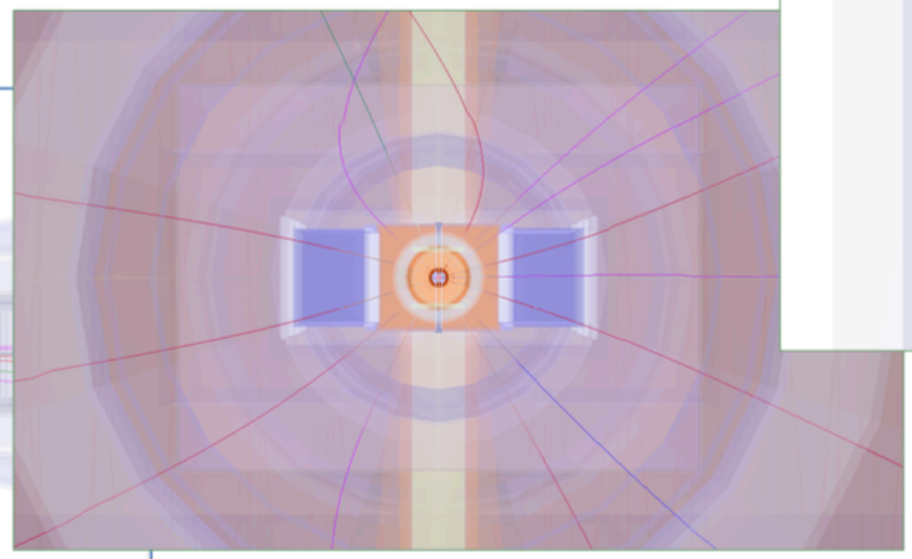

The Masterclass day:

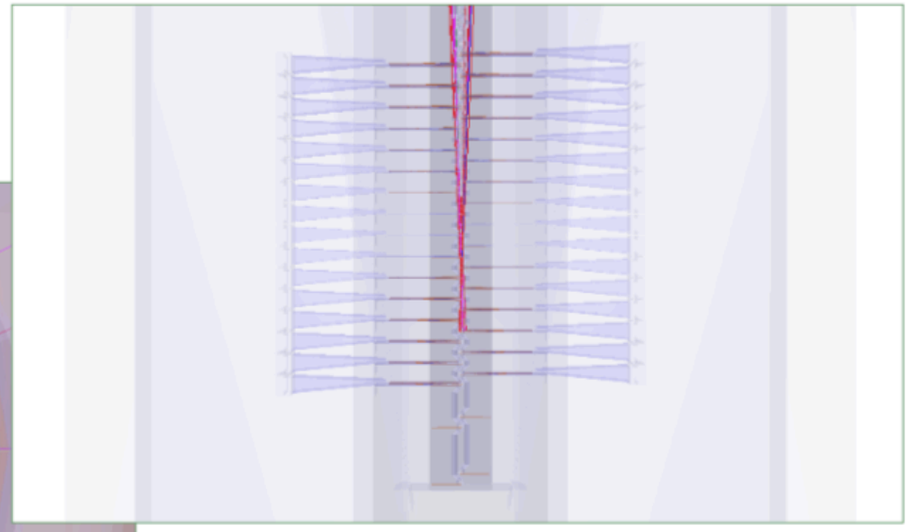
- Students go to a **nearby** University or research centre
- Perform **measurements on real data** gathered by particle physics experiments
- Participate in an international video conference for discussion of results

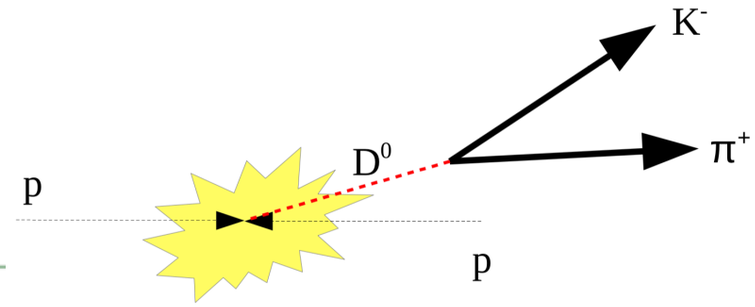
MASTERCLASSES: Find D^0 mesons

- Projections:



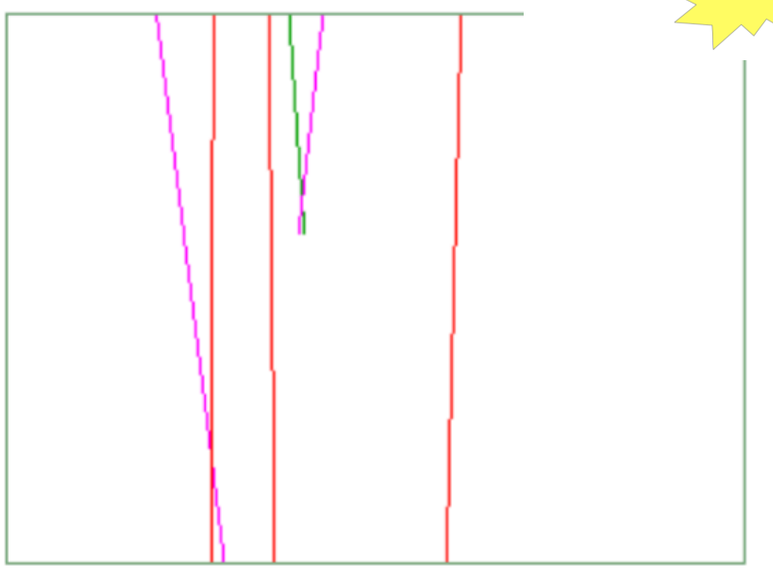




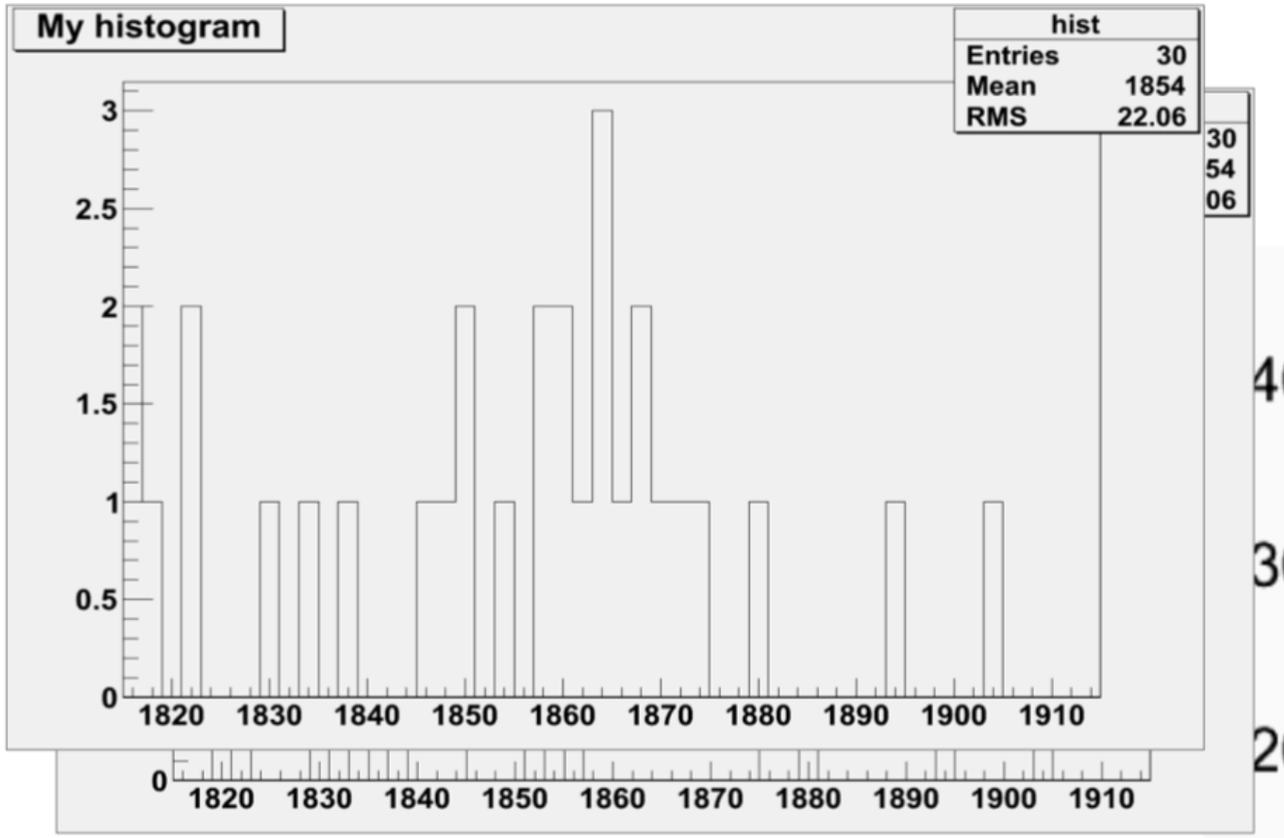


- Close-up:

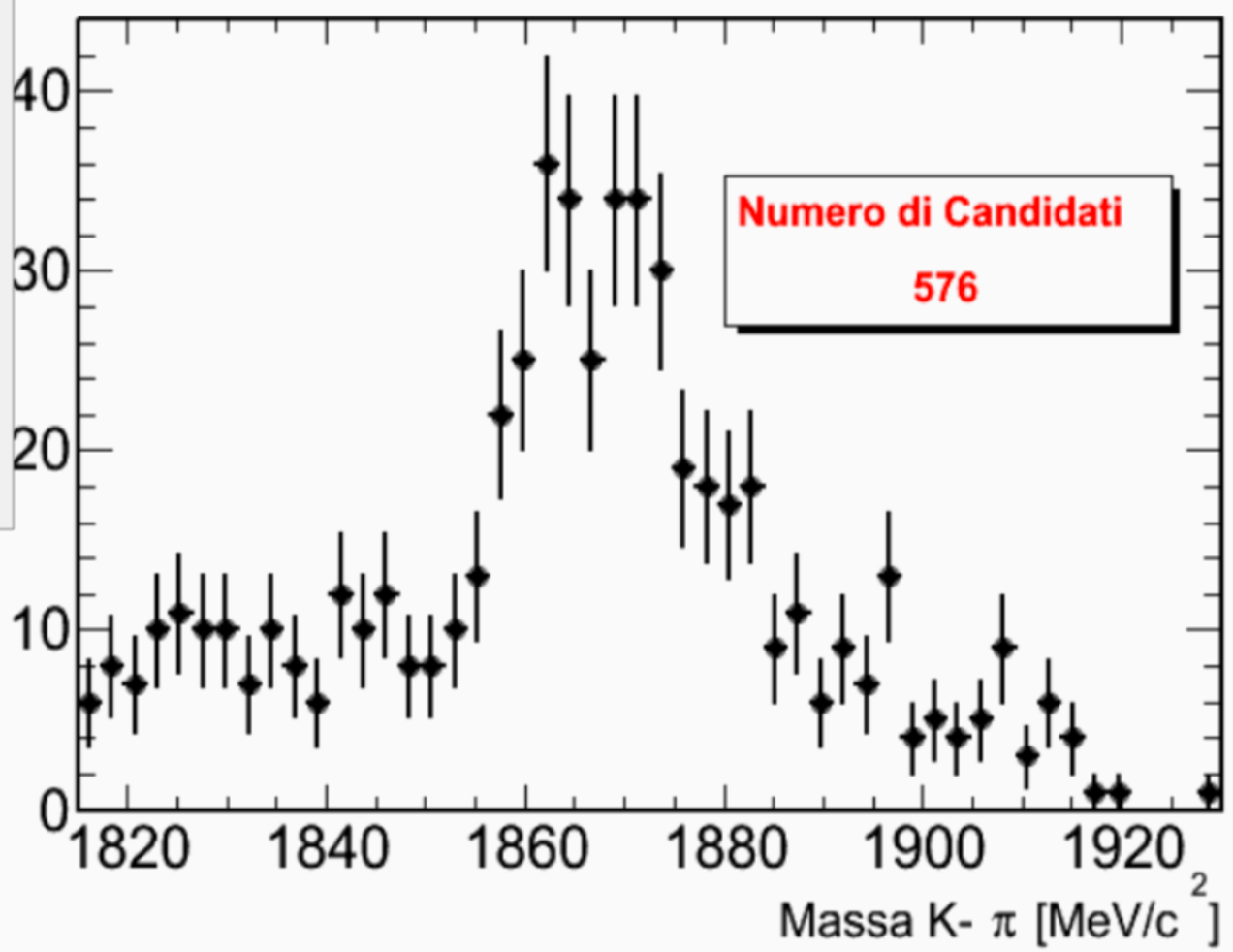
Find vertices



MASTERCLASSES: D^0 mass peak



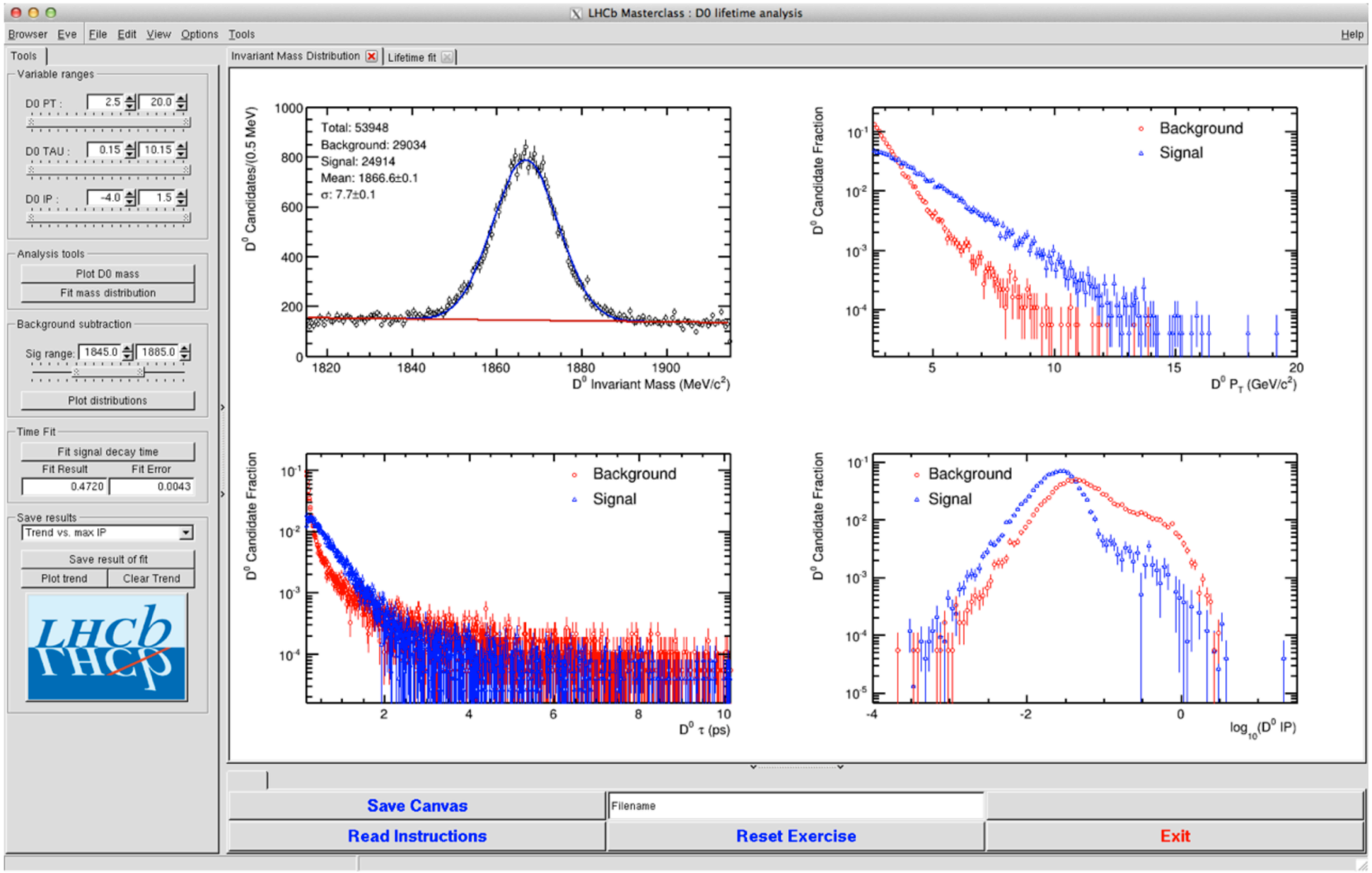
Build a mass peak



MASTERCLASSES: Measure D⁰ lifetime

Fit to the Kπ invariant mass to remove background and lifetime fit.

Play with D⁰ lifetime



Can change IP cut to study systematics!

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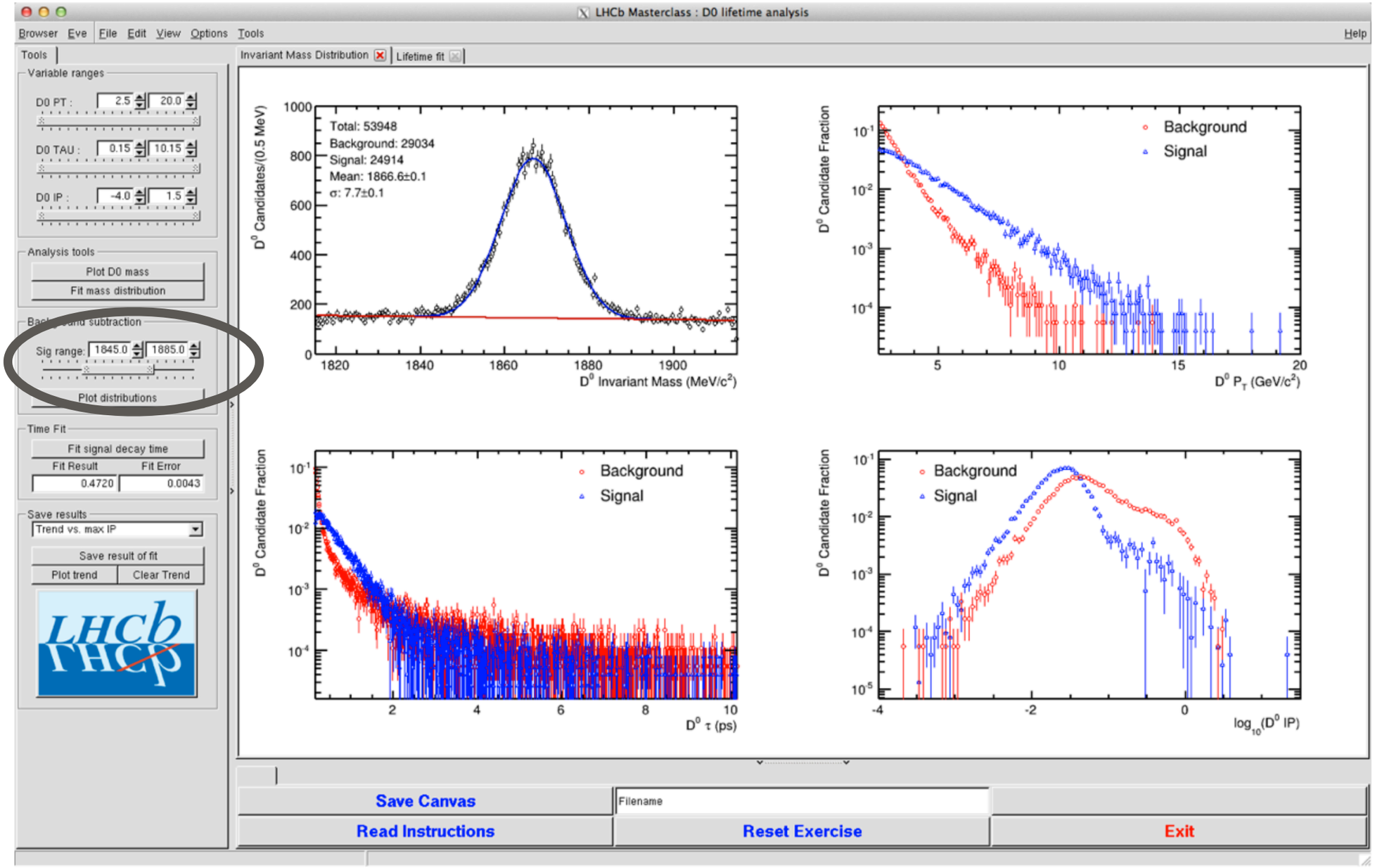

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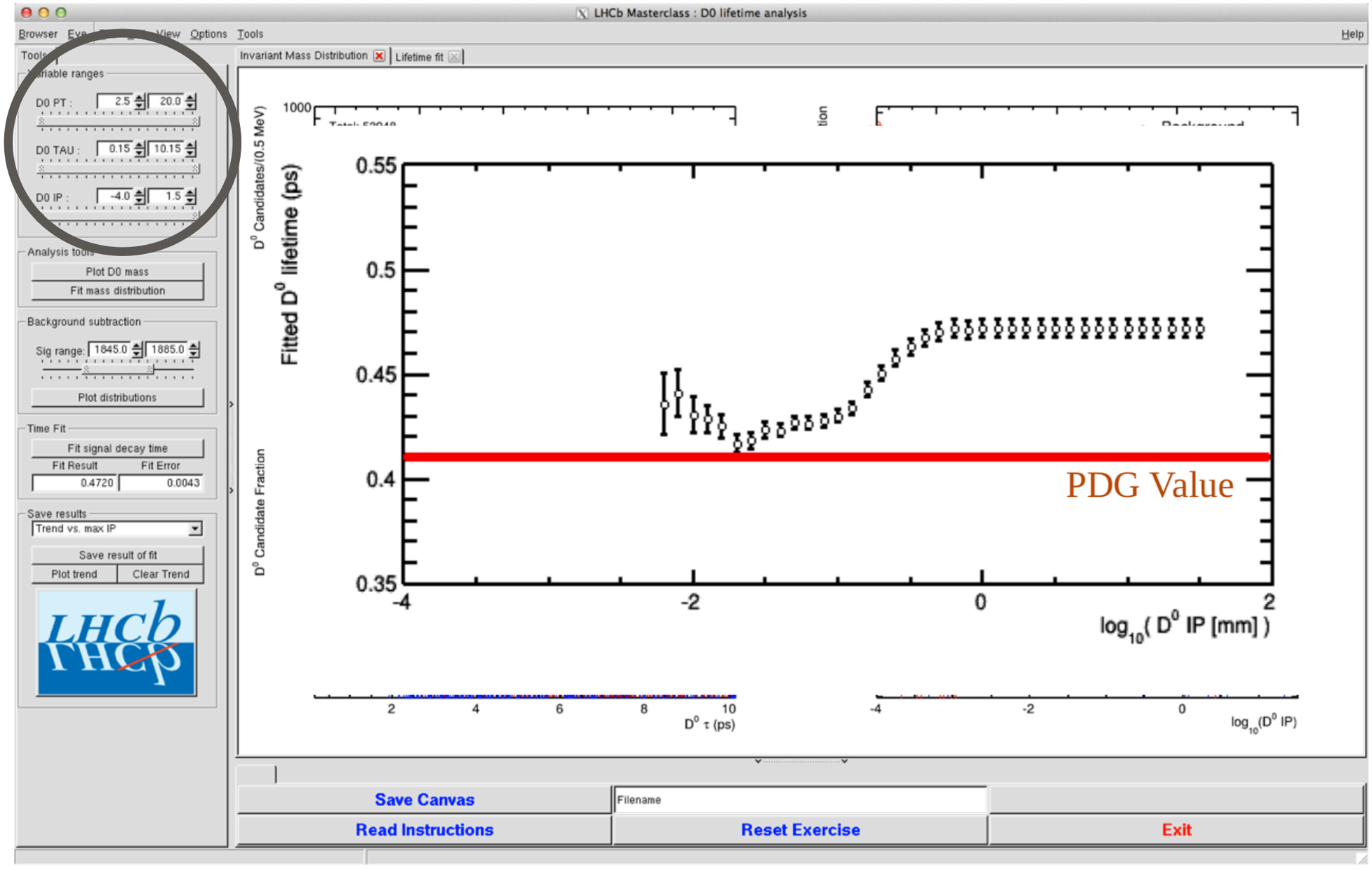
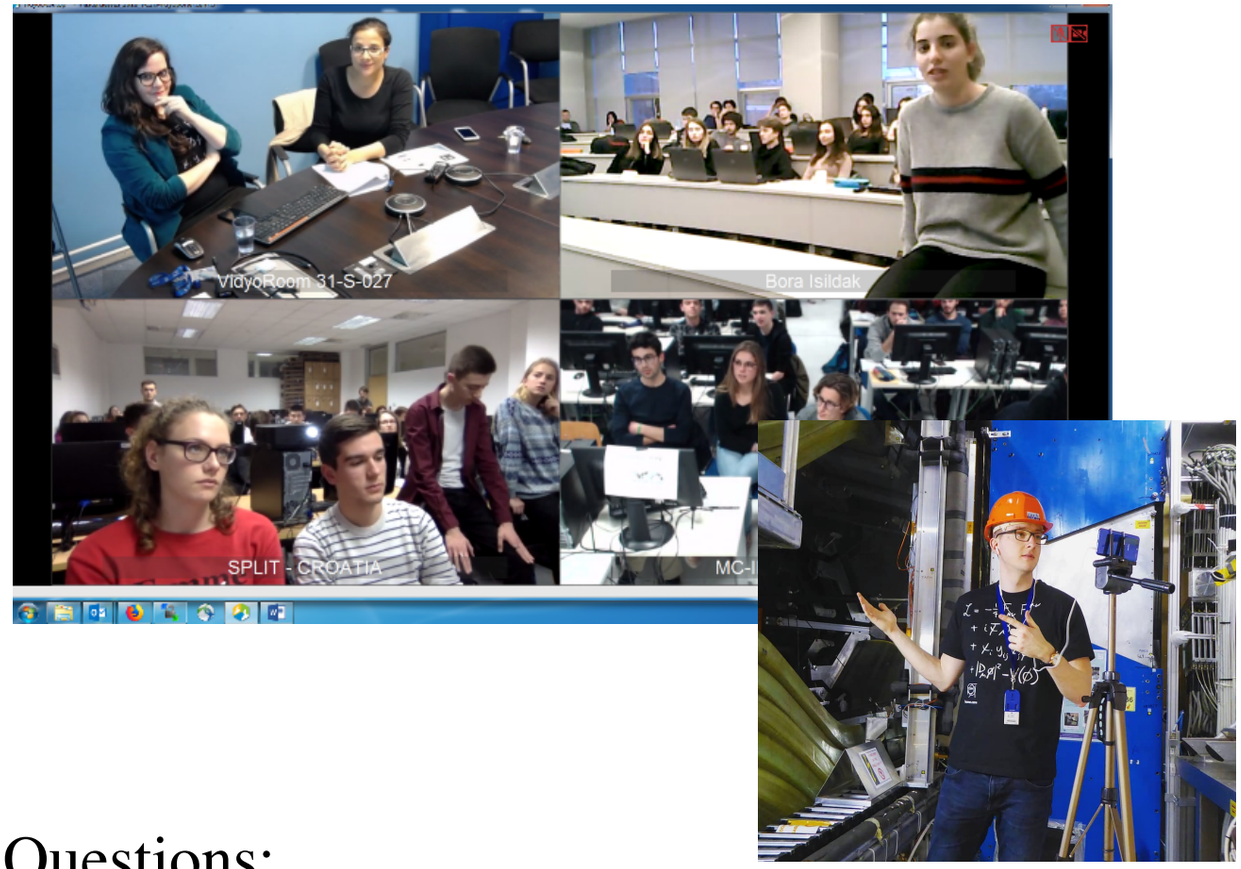


Can change IP cut to study systematics!

MASTERCLASSES: Result discussion



Video conference :

- Ice breaking (5-10 min)
- Result discussions. (20 min)

  ➡ Includes live merging of histograms from all institutes!!!

- Questions (30 min) :

  ➡ Correspondent from the Pit!

- Quiz if time is left

Questions:

✓ About physics: “Will we ever discover the smallest particle”

✓ About CERN: “How many people work at CERN”

✓ About future plans: “What is going to happen after LHC”

✓ About life at CERN and as a researcher: “What do you do in a normal work day”

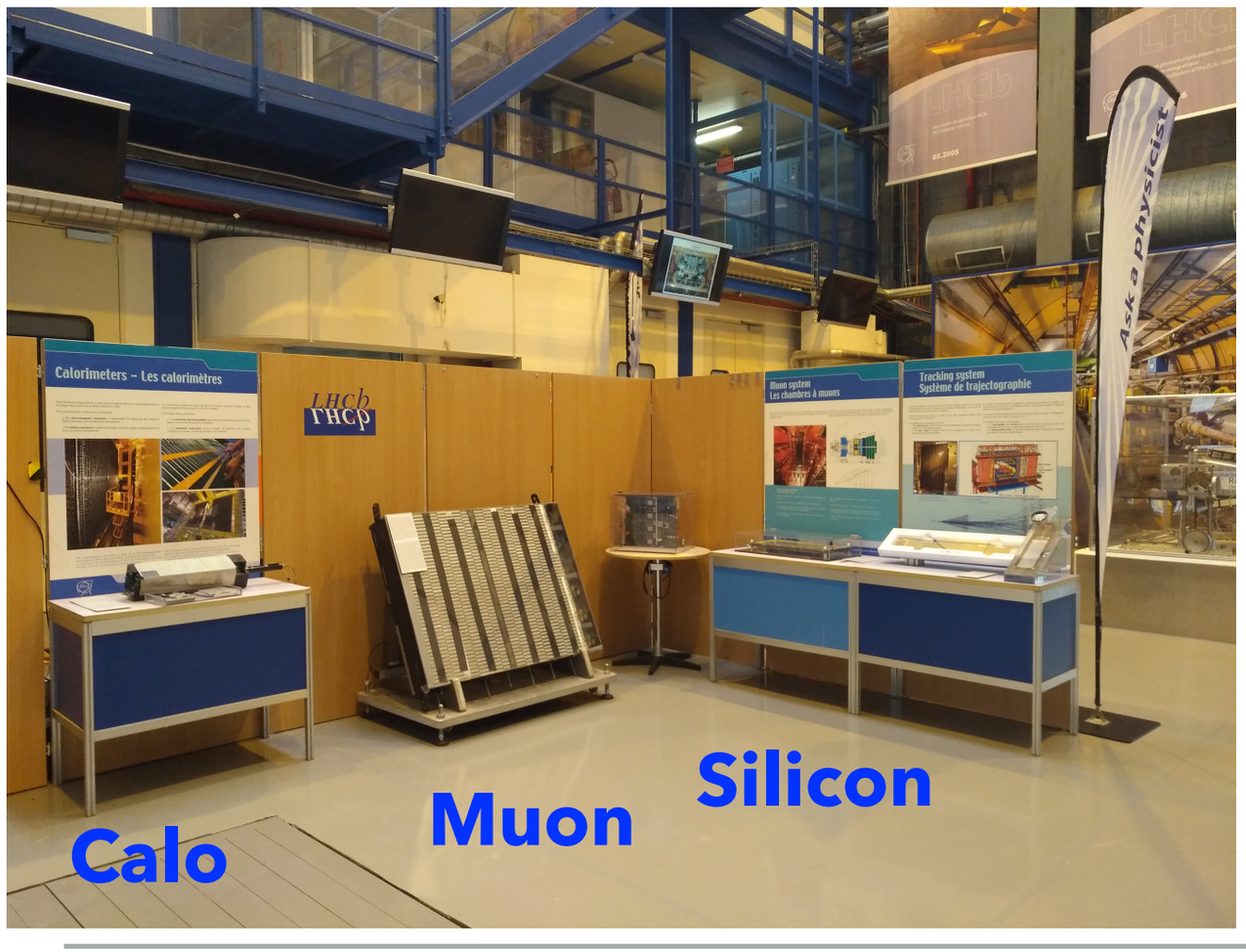
✓ About how to become a researcher

VidyoDesktop™ - Masterclasses_2018_VC2@vidyoportal.cern.ch

EXHIBITION

An exhibition is always in development at point 8

- Part of sub-detectors on display: RICH, Calo, Muon and a full spare of the VeLo
- Large posters covering important topics for LHCb:
  - ✓ search for new physics (rare decays)
  - ✓ different properties of matter and antimatter (CP violation)



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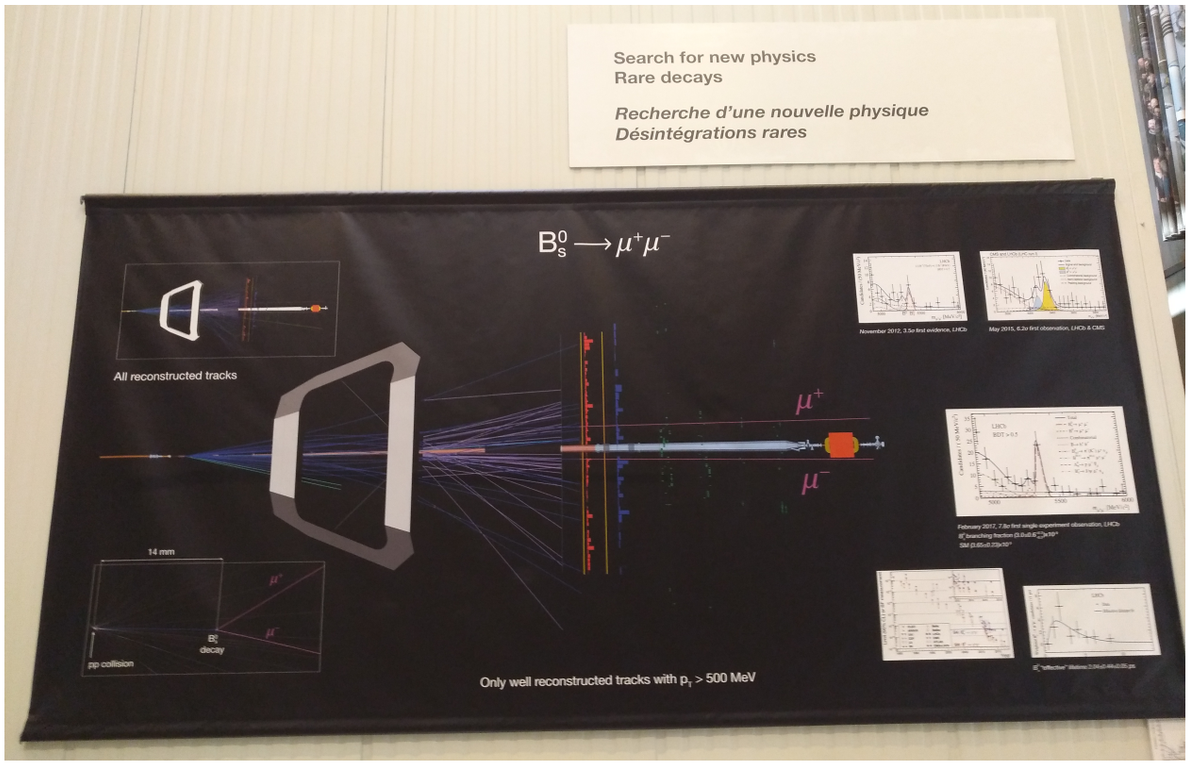
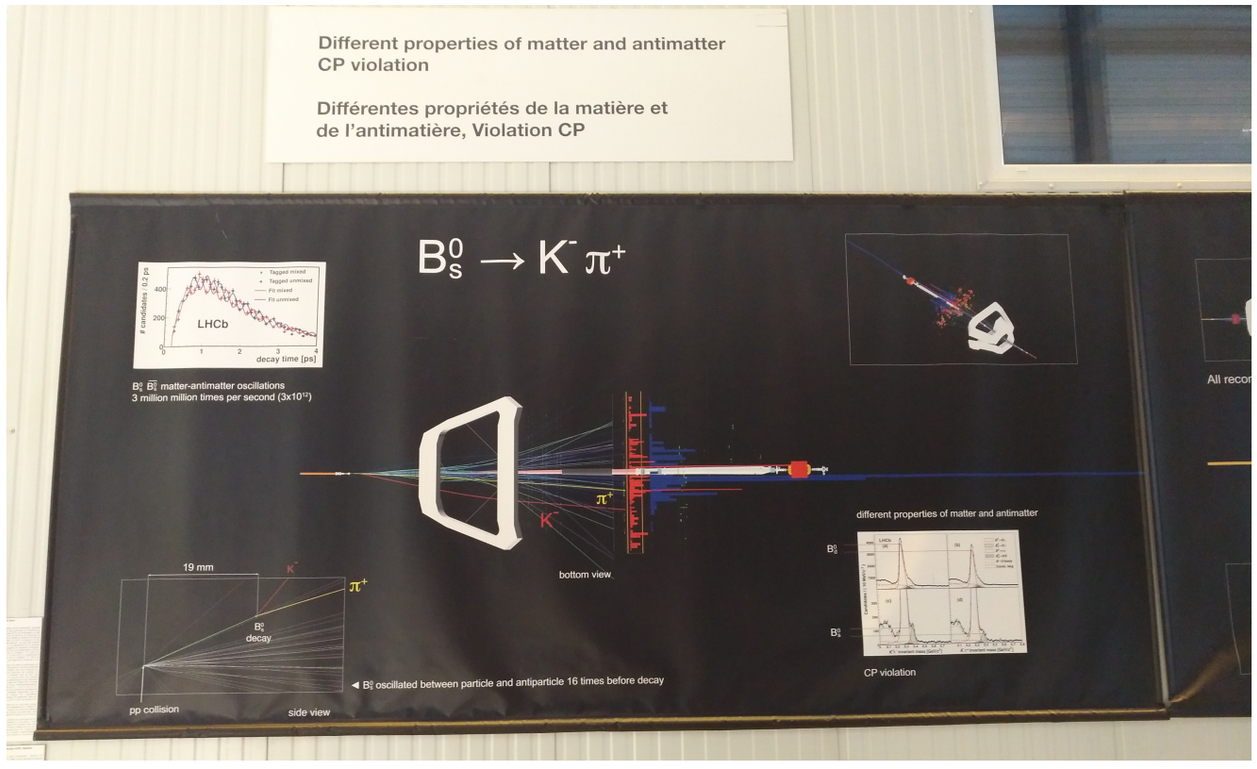


Rare decays: Bs→μμ



CPV: Bs→Kπ

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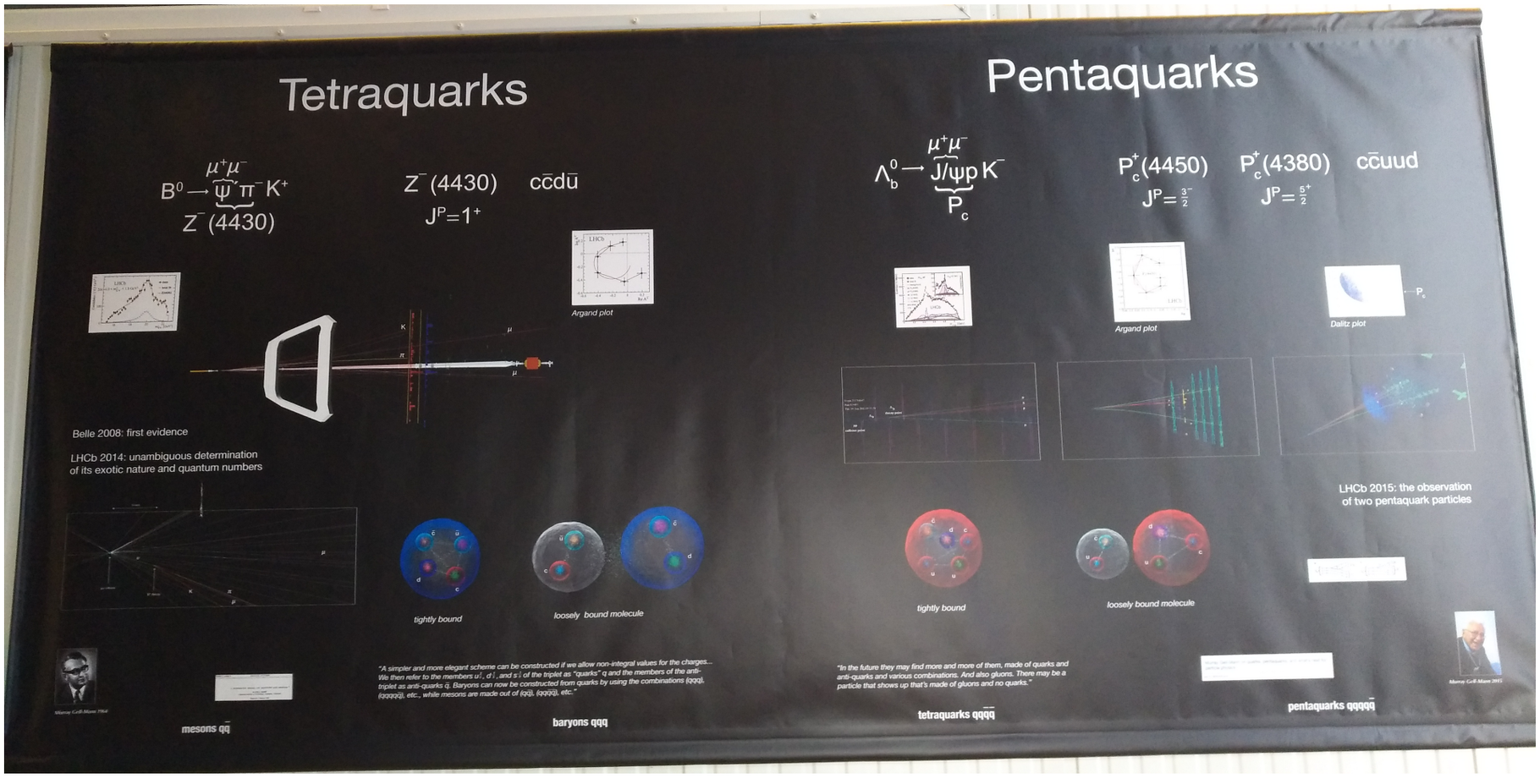
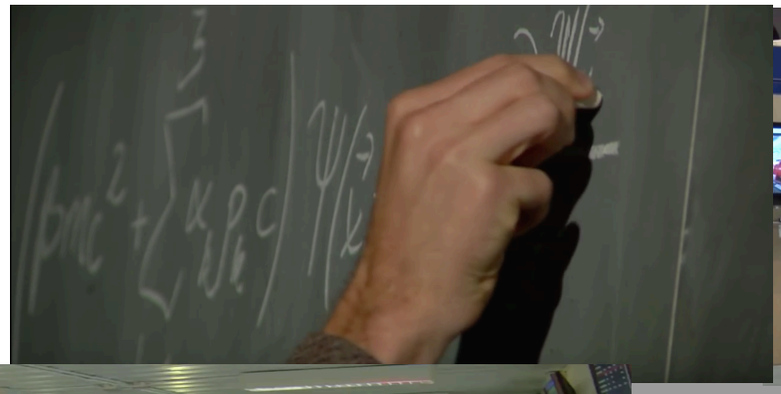
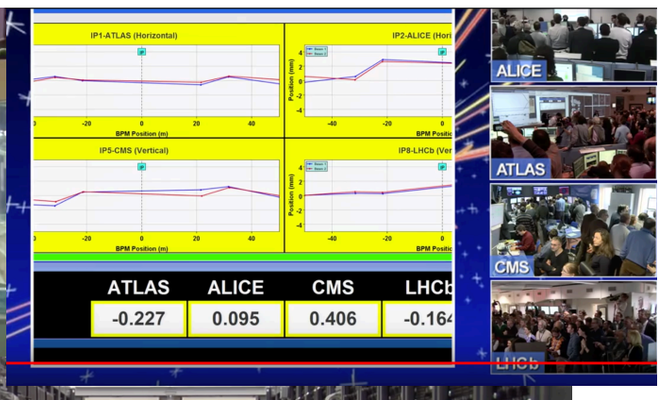


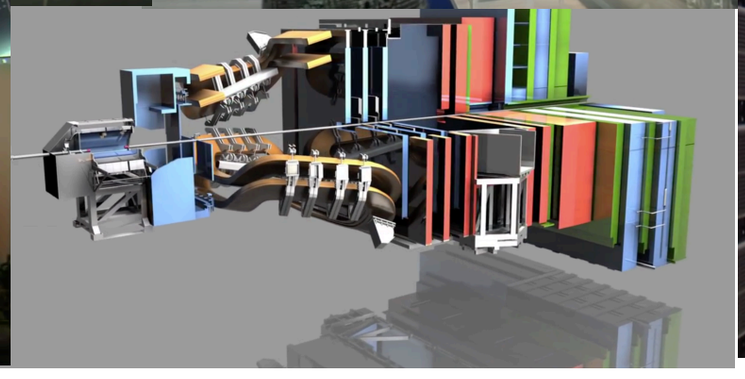
VIDEOS

One video is already available **LHCb - The Beauty experiment** (2011) 14 min long:

- Intro to LHCb and report of the LHC first collisions
- On Youtube : www.youtube.com/watch?v=rsmBMuTFdkA
- Shown to visitors at the Pit





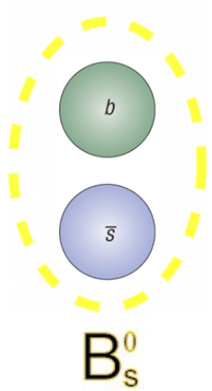


VIDEOS

A second video (20 min) is being finalised covering the Bs→μμ discovery!

COMING SOON

From the basic ideas to the event selection to the publication.
Including the healthy competition with CMS.



A “strange beauty” discovery.

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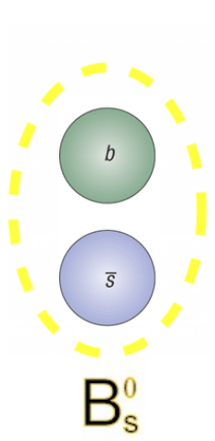

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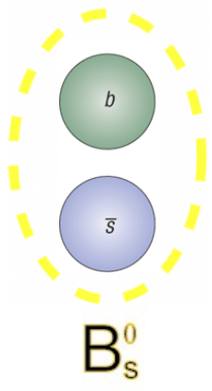

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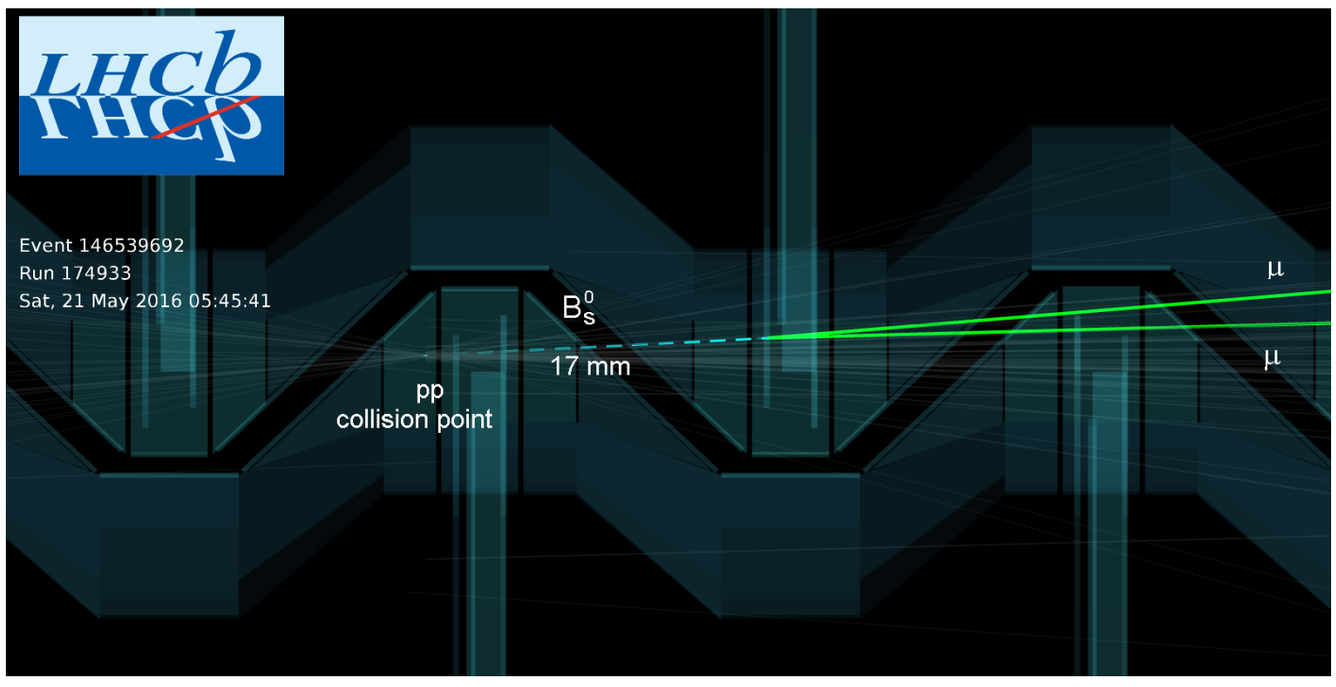

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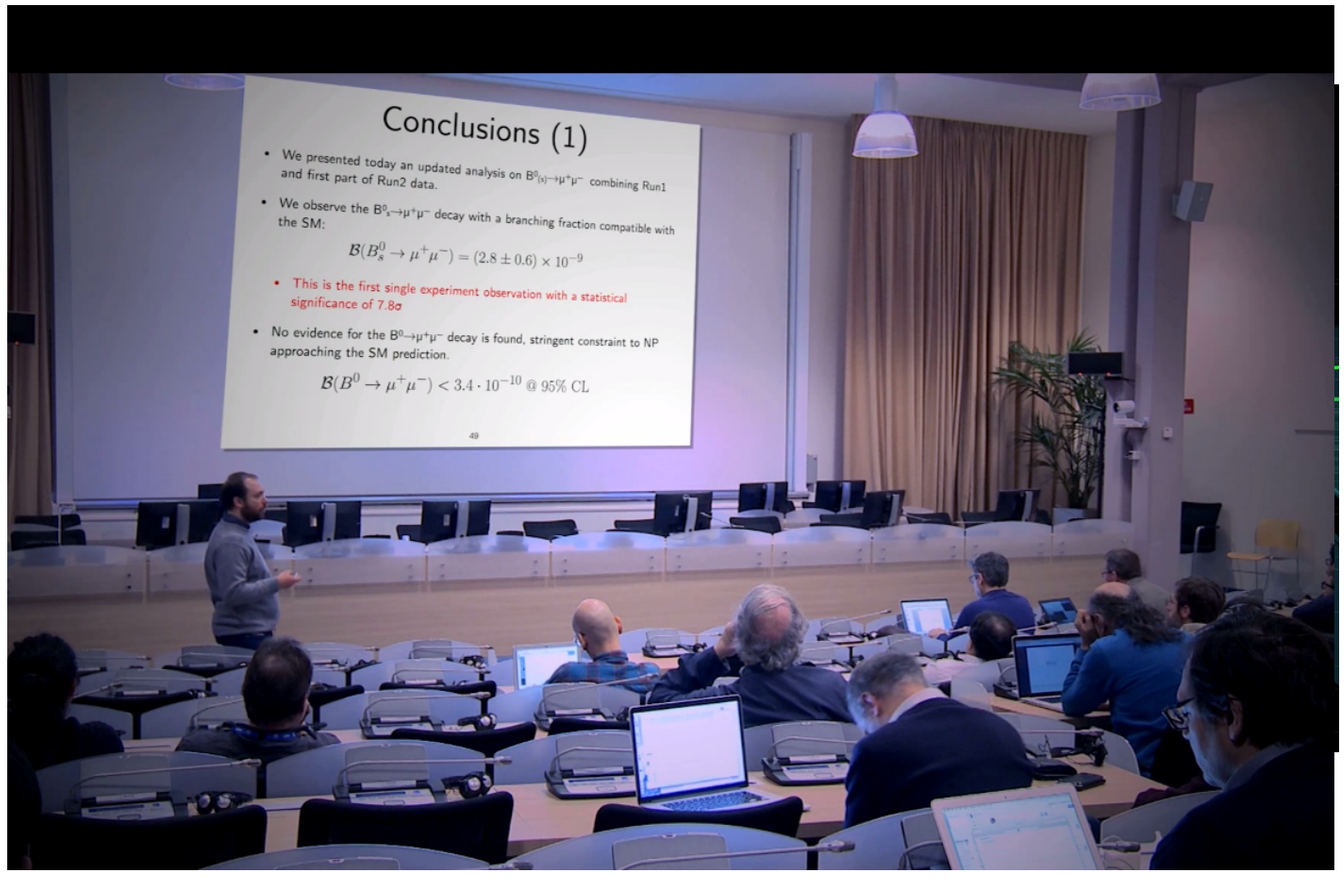

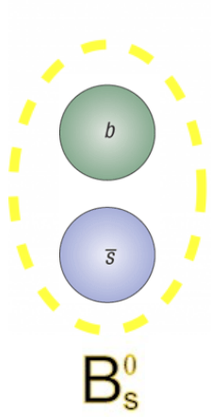

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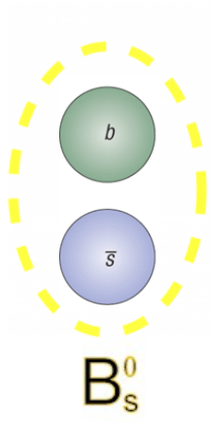
https://arxiv.org/abs/1411.4413



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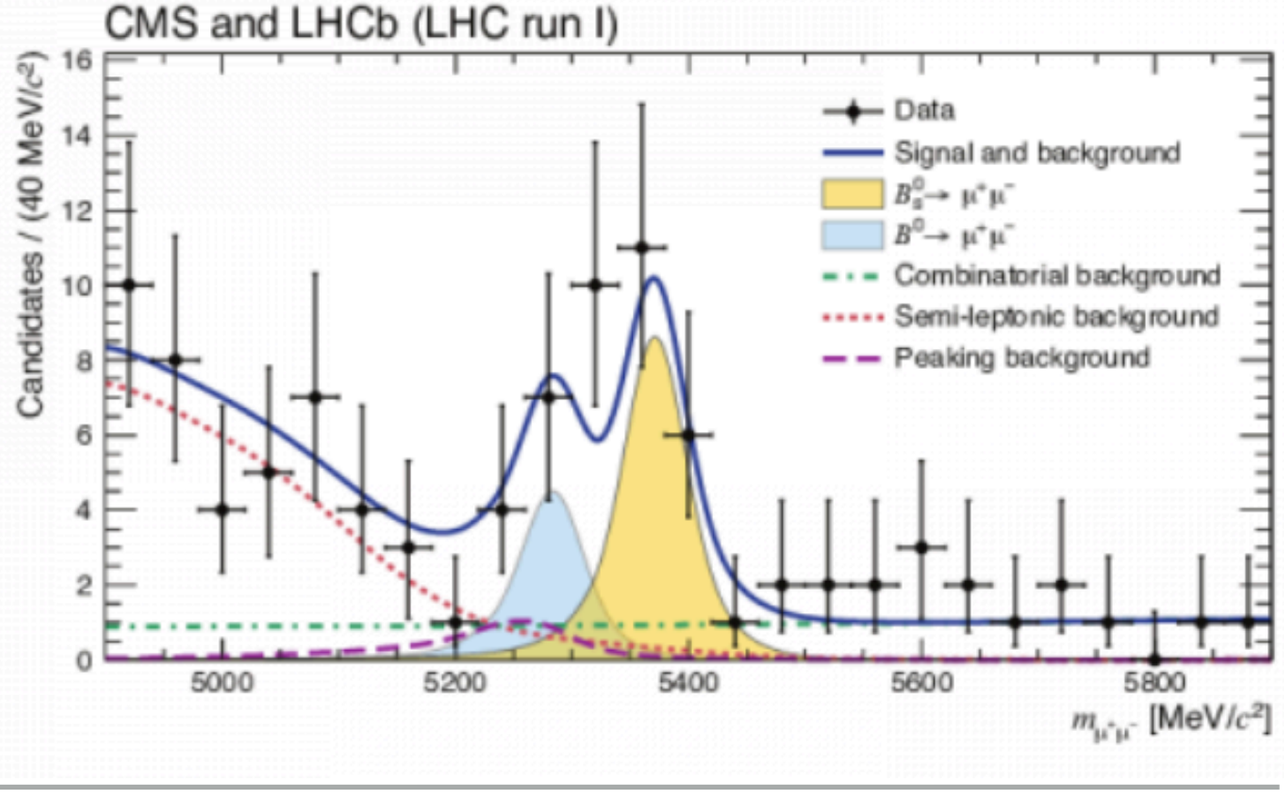
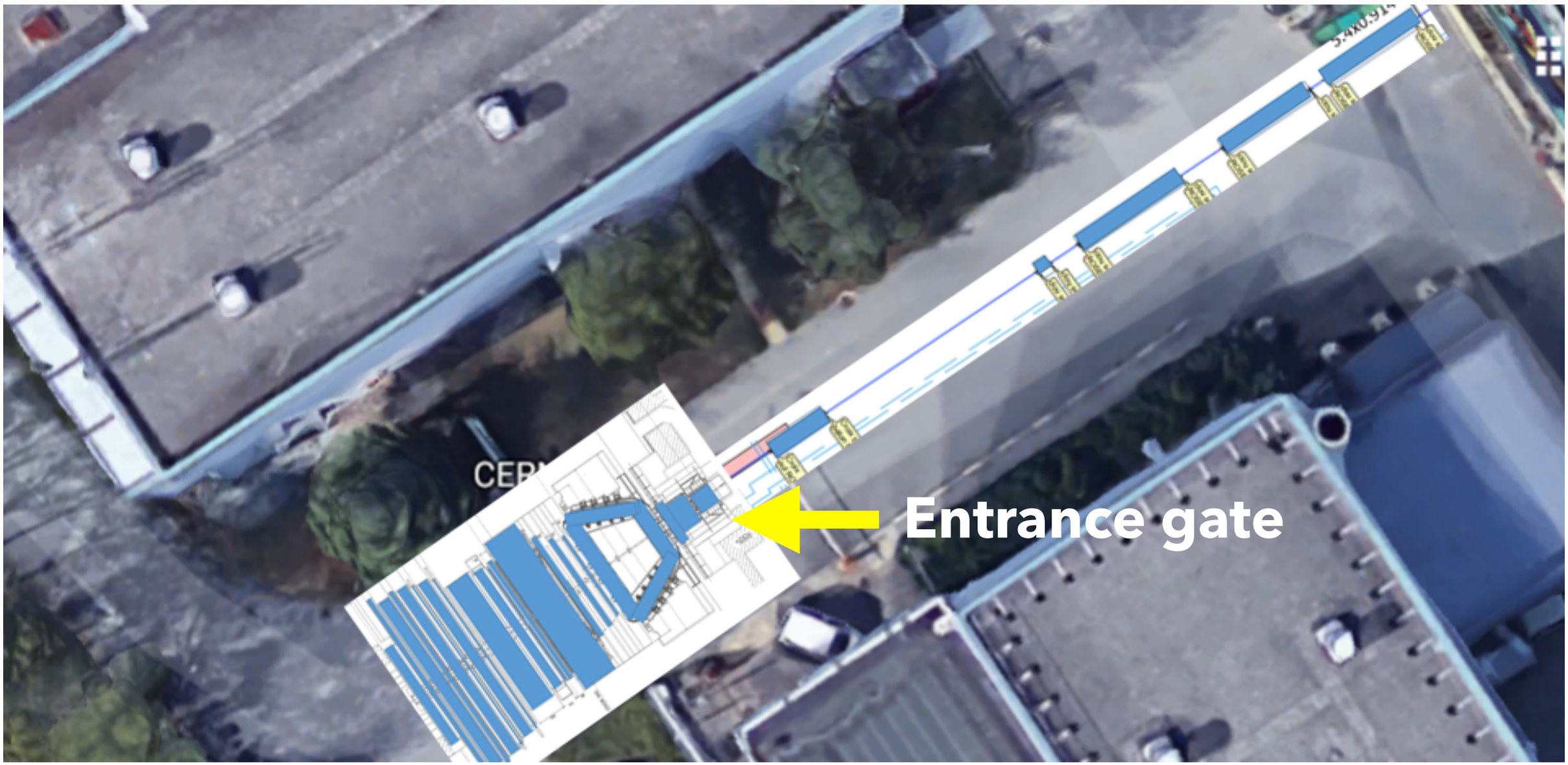


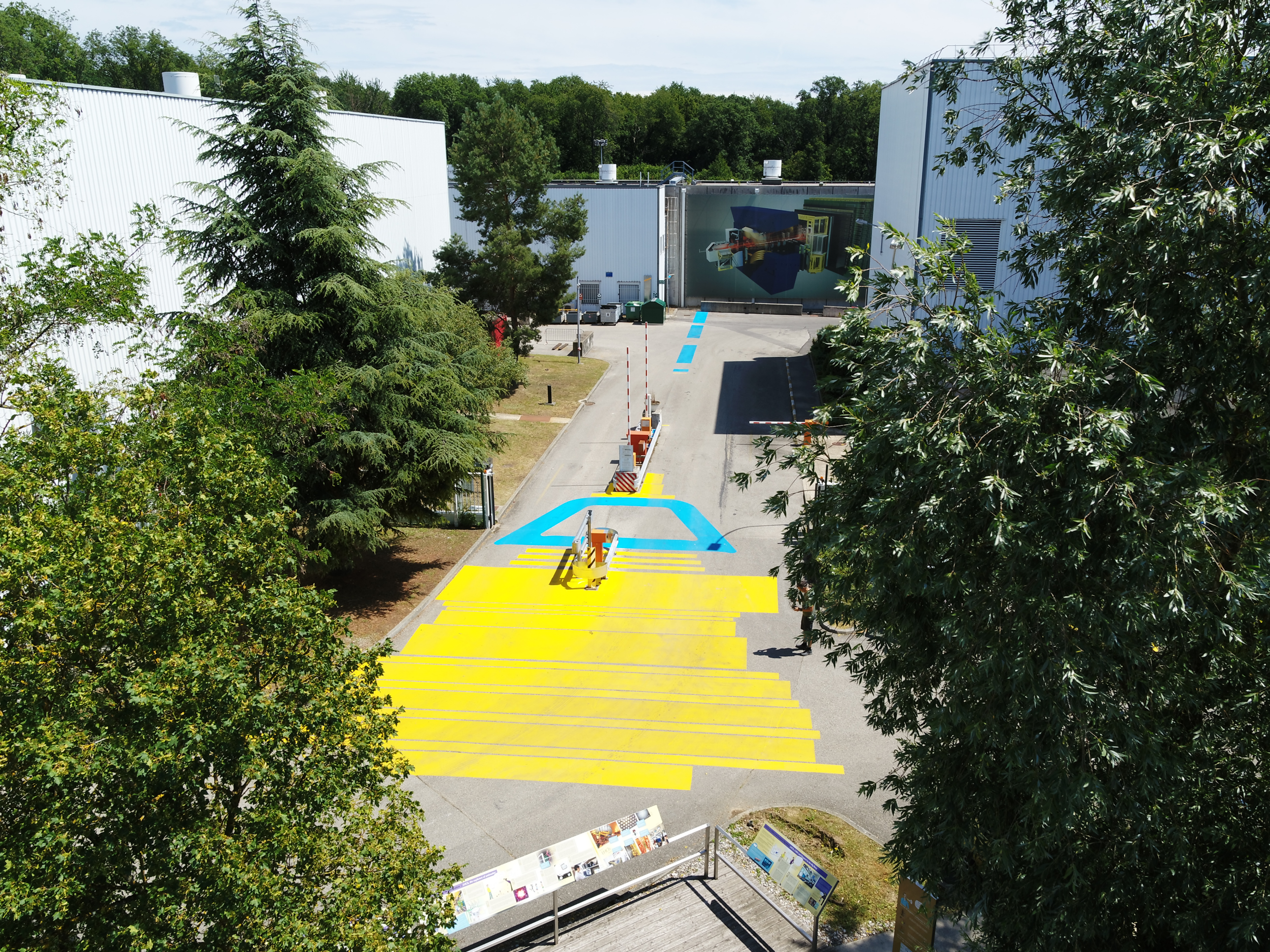
STREET ART

LHCb is aligned with the entrance road at P8. The gate it's placed exactly above VeLo!

→ Will paint a 1/1 sized LHCb on the road.



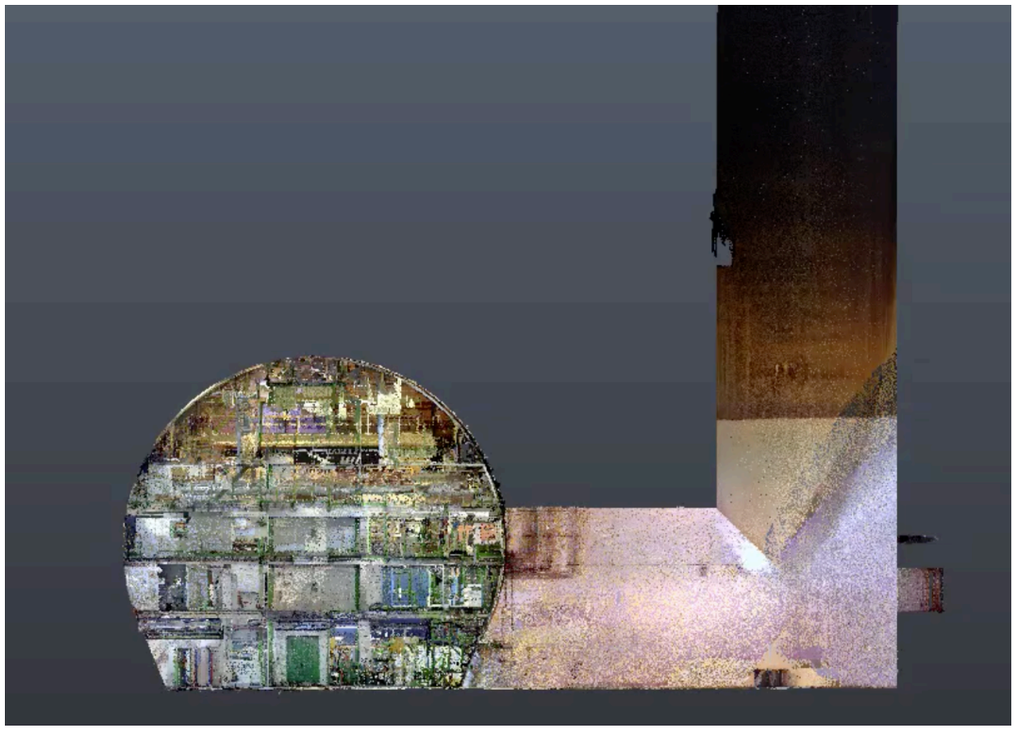
Just finished
Last week!

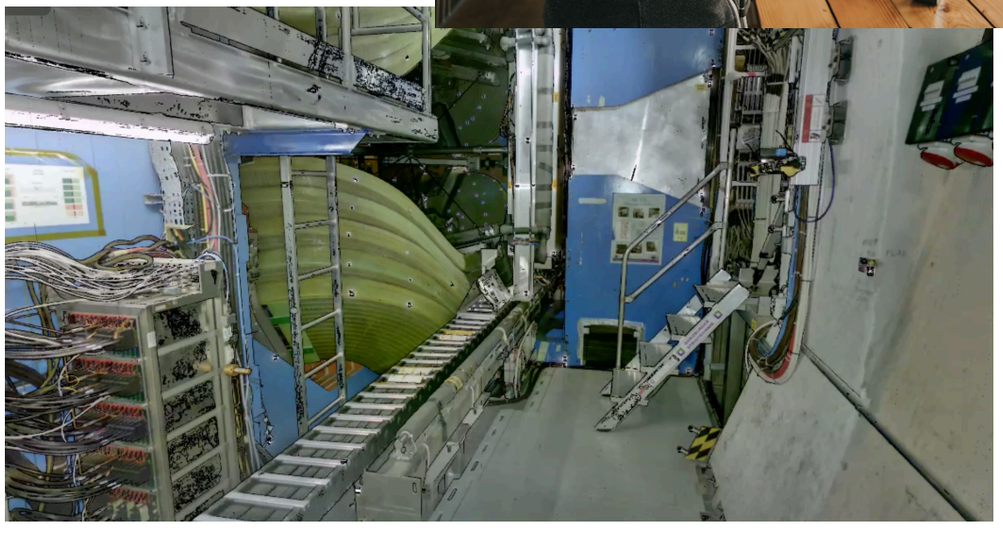


LASER SCANS

Laser scans of the cavern: 3mm @10m point spacing/resolution

- Initial motivation: 3D CAD model for scientific heritage
- Received funding from EPS Outreach Group
- Scans done on September 2017
- Can be used for Virtual Reality!



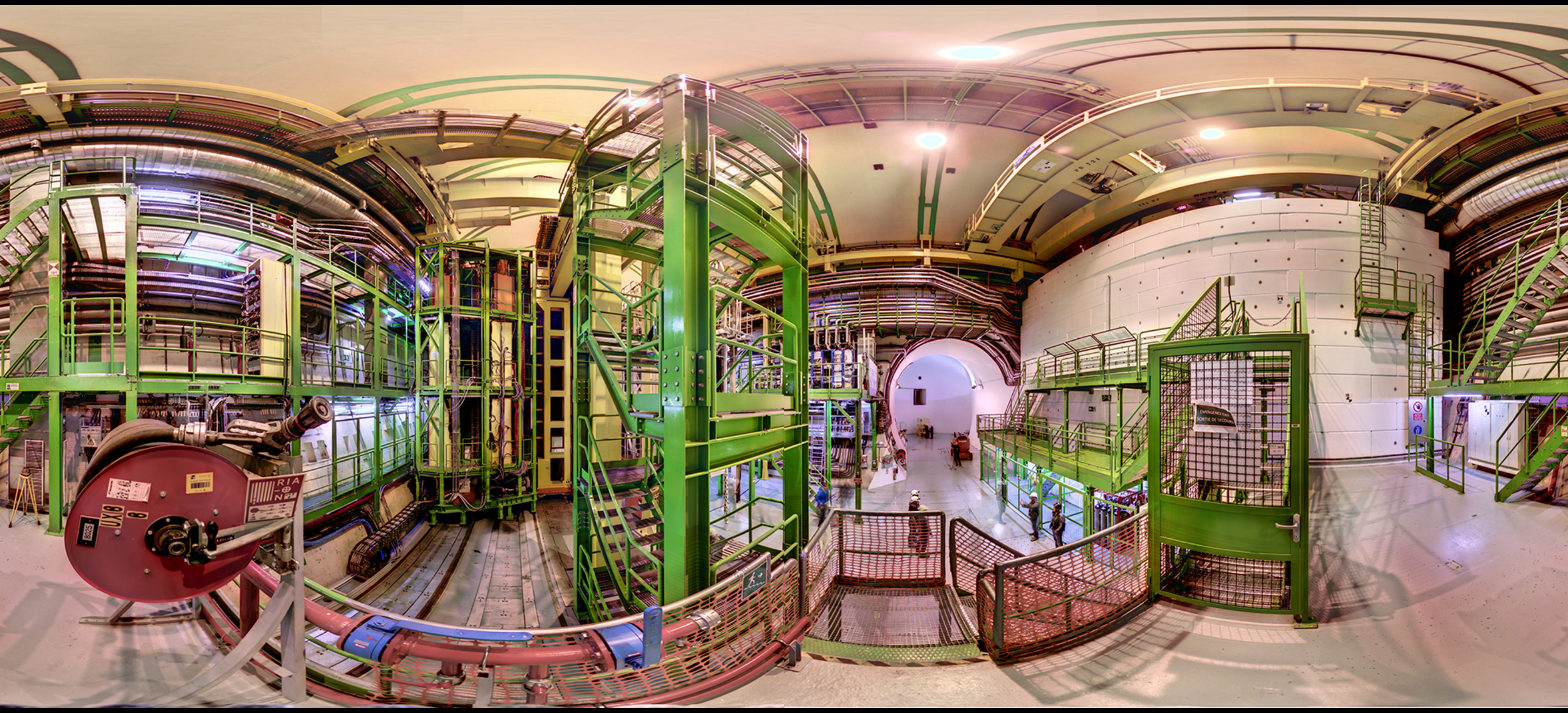


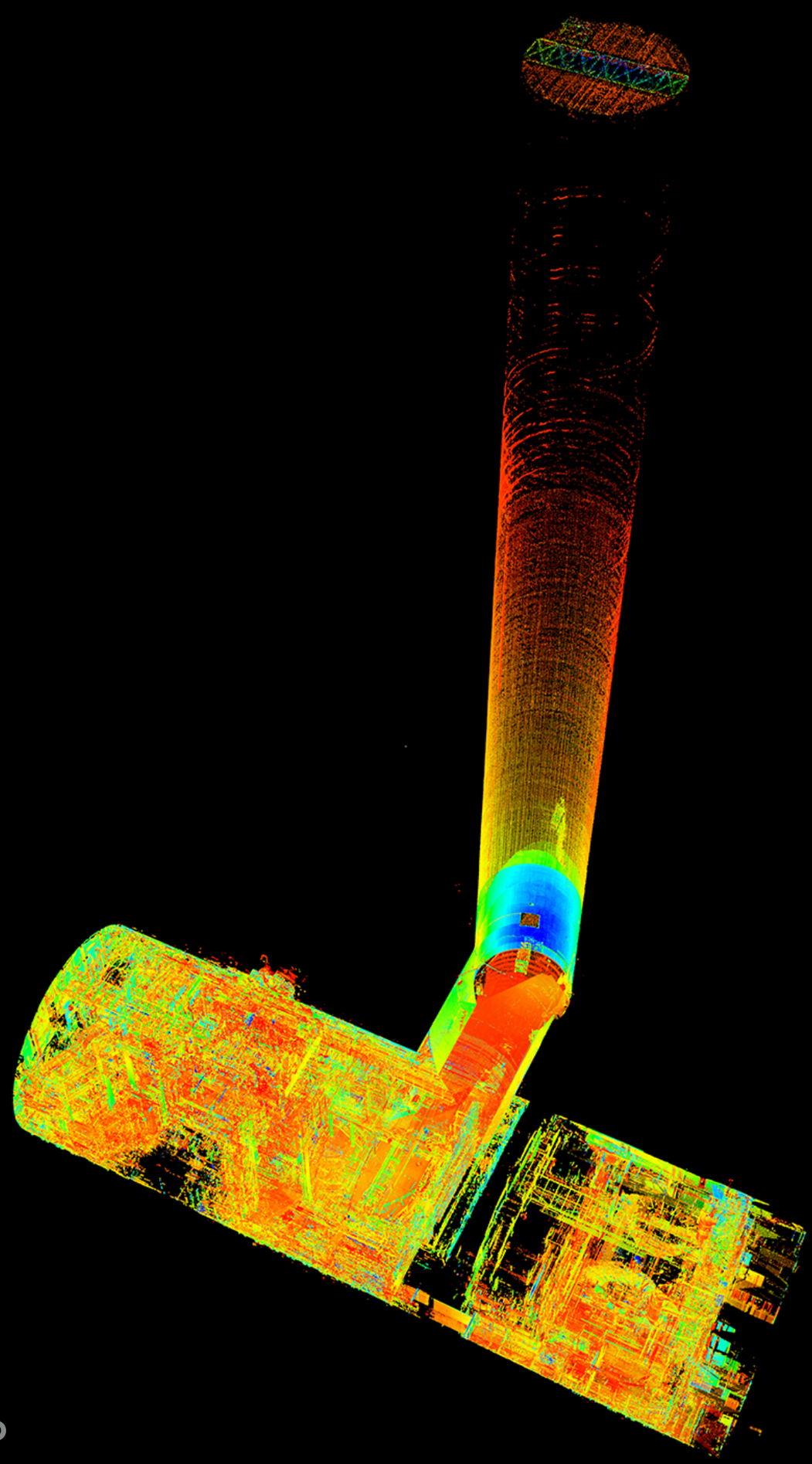
160 scans around the covern!

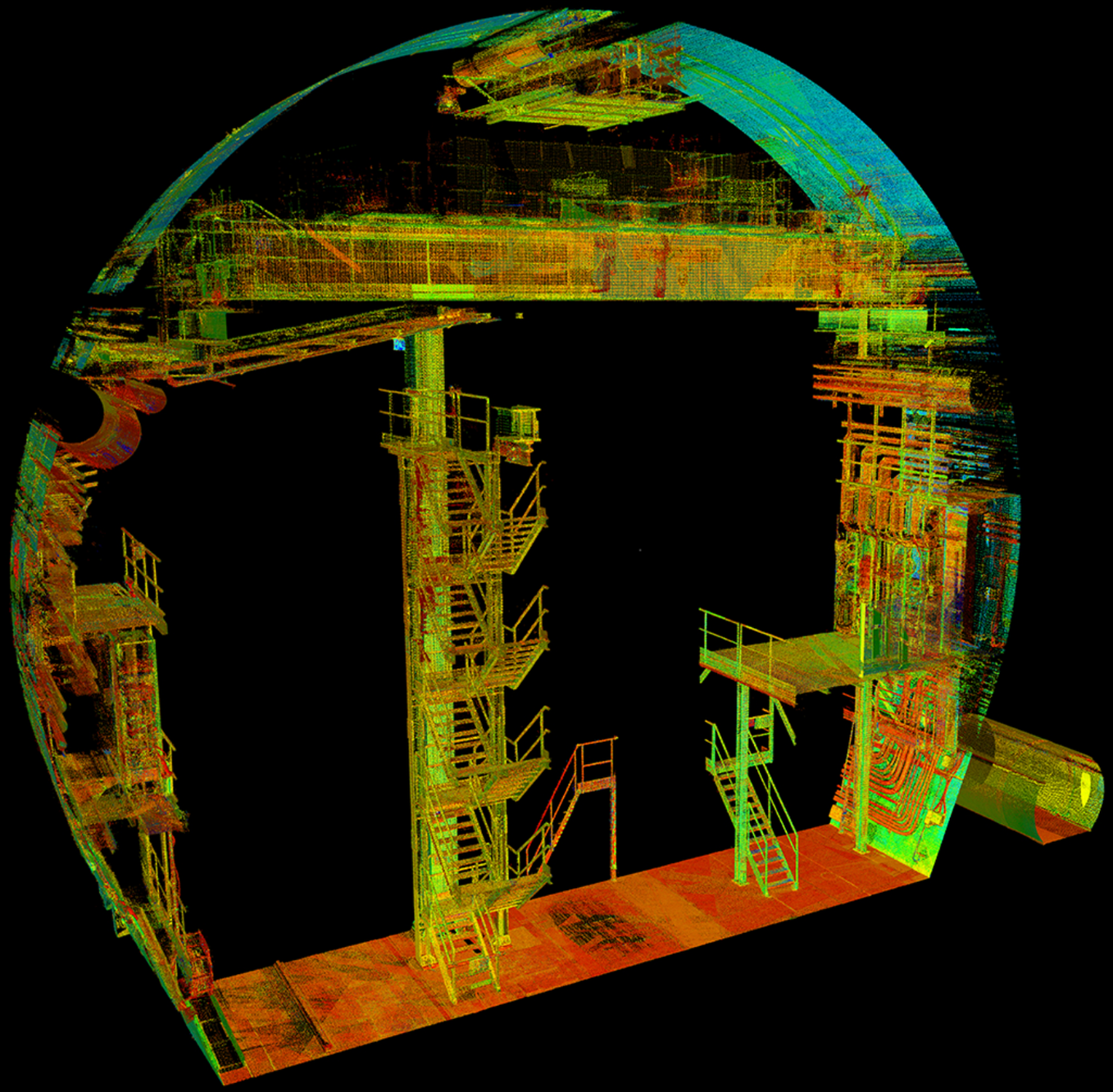
Tracking stations

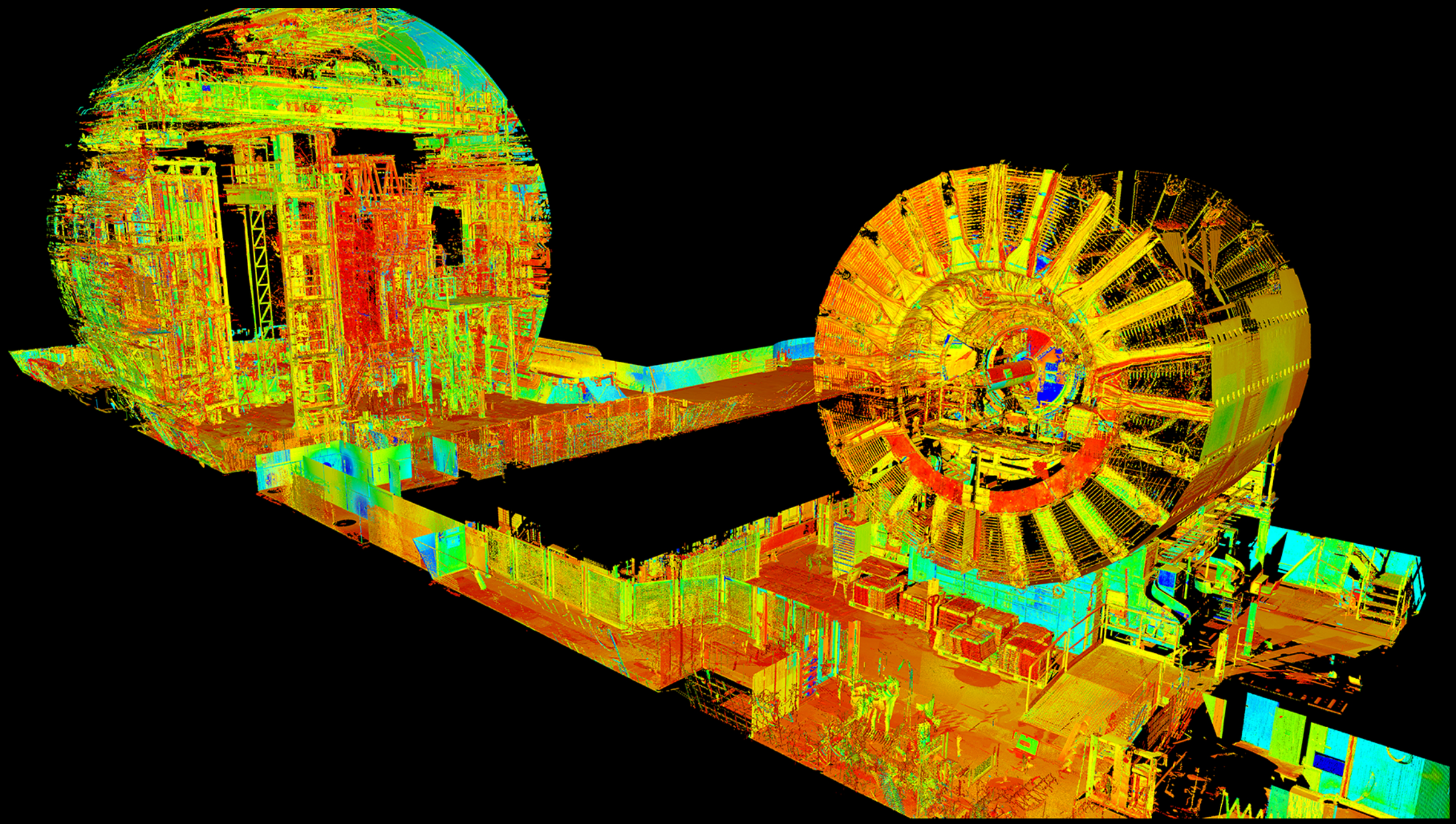
Laser scanner

HDR images takes at same time









CONCLUSIONS

LHCb is committed to bring science to a wider audience

- **A range of projects are in development at P8**
- **Keep attention on the web is important**
- **Masterclasses were a success!**

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- **A range of projects are in development at P8**
- **Keep attention on the web is important**
- **Masterclasses were a success!**

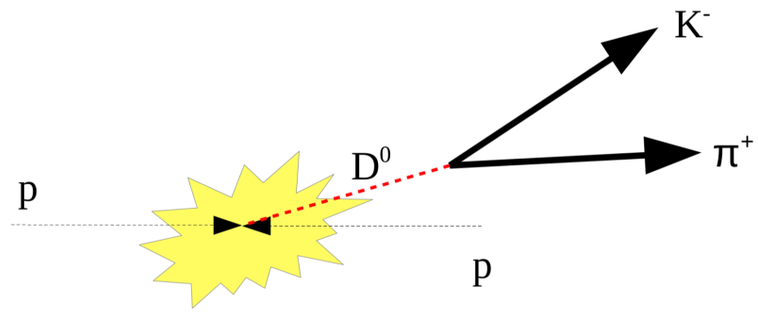
Thanks for your attention!

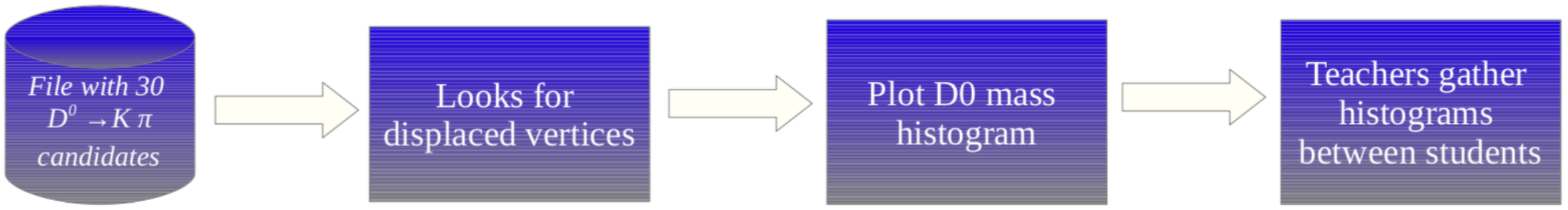
BACKUP

MASTERCLASSES: Measurement of D^0 meson lifetime

1. Build mass histogram and identify signal

Using the event display to search for displaced vertices





2. Measure the D^0 lifetime

Fitting the lifetime and improving S/N ratio by cutting on the D^0 Impact parameter