

# Event Displays in LHCb

HSF Visualization workshop

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for the LHCb Computing Team*

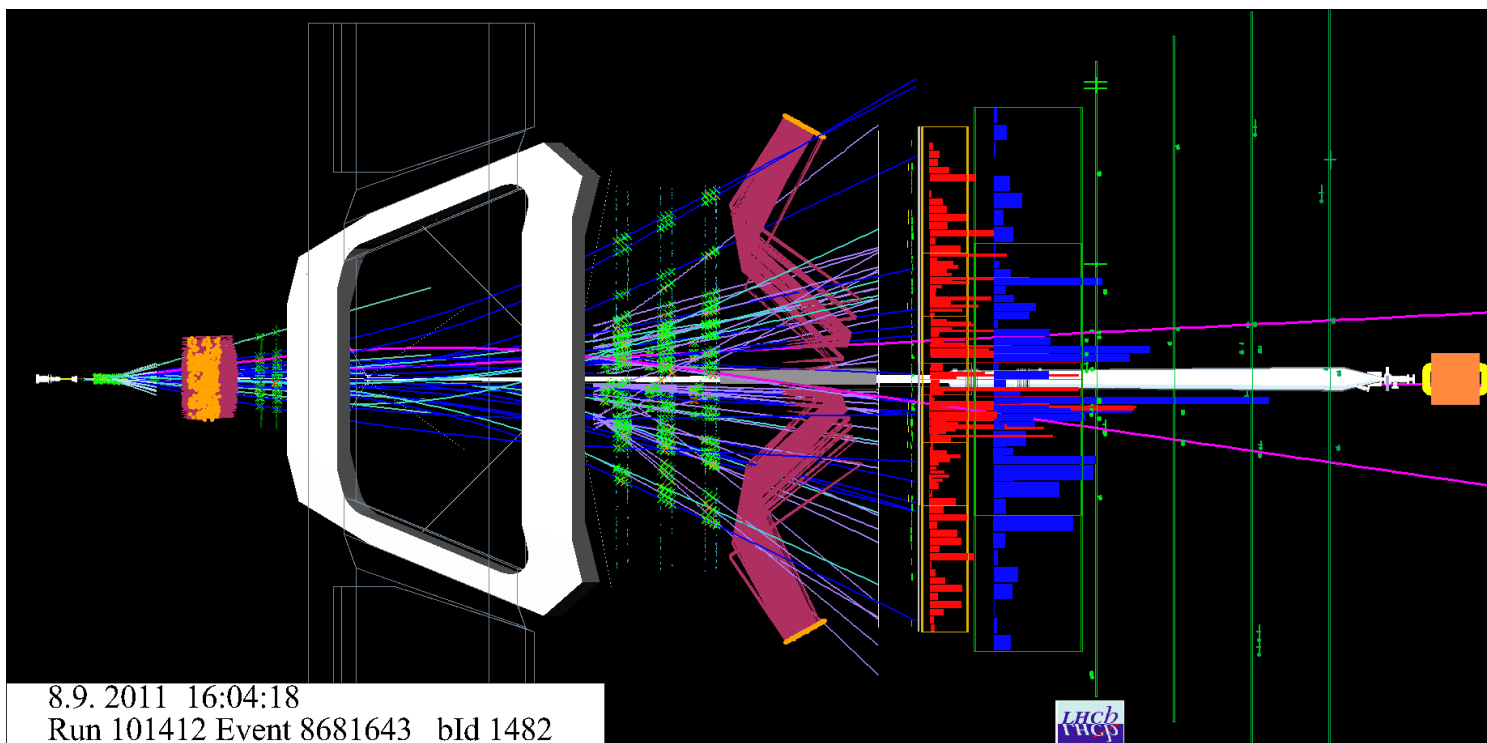


# Introduction

- Several applications for event display are used within LHCb
  - Panoramix: Generic tool for geometry development and general display
  - Masterclass display
  - Online event viewer
- Different feature sets leading to different solutions...

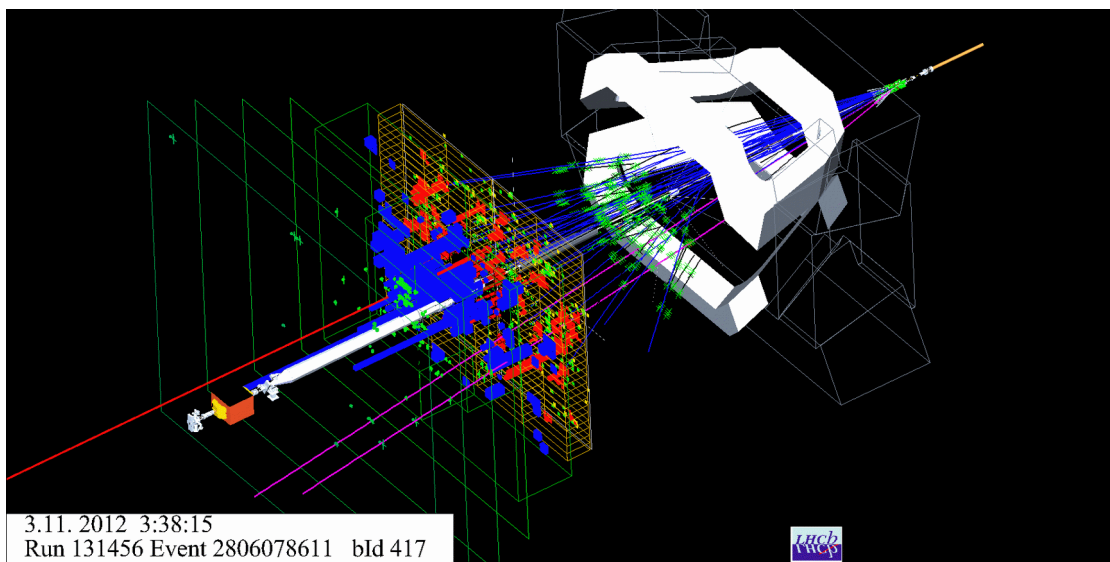
# Panoramix Event Display

- **Gaudi** based application
  - G. Barrand CHEP 2004 <https://cds.cern.ch/record/865604/files/p365.pdf>
  - Release page:  
<http://lhcb-release-area.web.cern.ch/LHCB-release-area/DOC/panoramix/>
  - Uses Onx ([http://openscientist.lal.in2p3.fr/osc\\_web\\_16/v16r0/html/osc\\_onx.html](http://openscientist.lal.in2p3.fr/osc_web_16/v16r0/html/osc_onx.html)) and Open Scientist



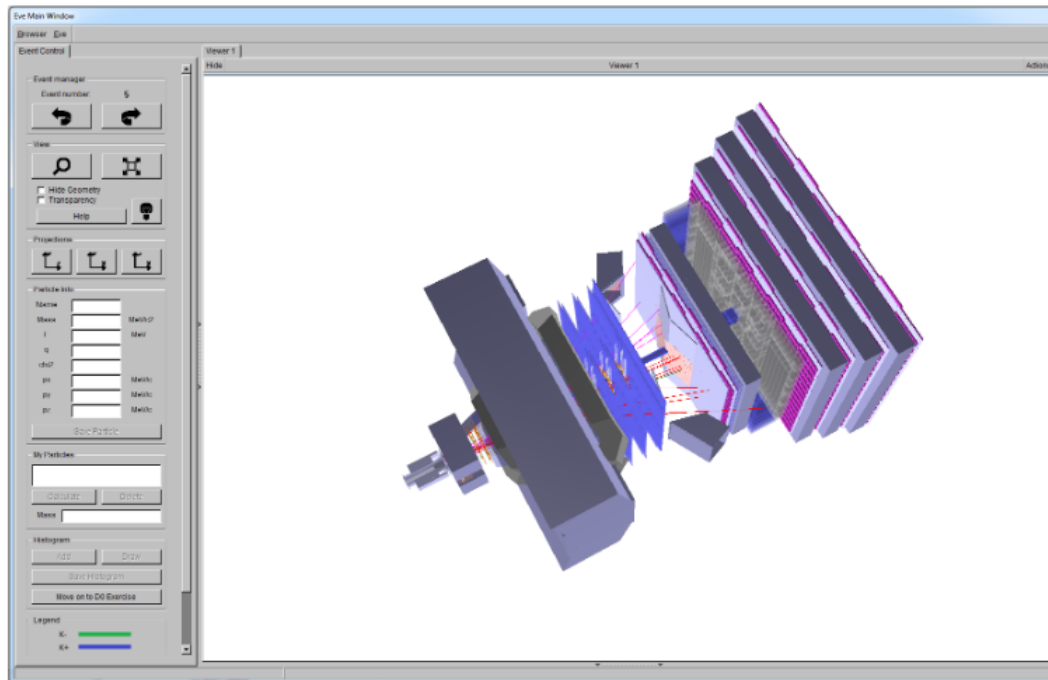
# Panoramix Event Display

- As a Gaudi application:
  - Used for Detector model design and checks
  - Has the advantages of being an LHCb Physics application:
    - It can load directly the geometry with conditions from Gaudi
    - It can show objects in the transient event store
  - But...
    - It requires a whole LHCb stack to run
    - It is slow to start
    - And is designed for experts



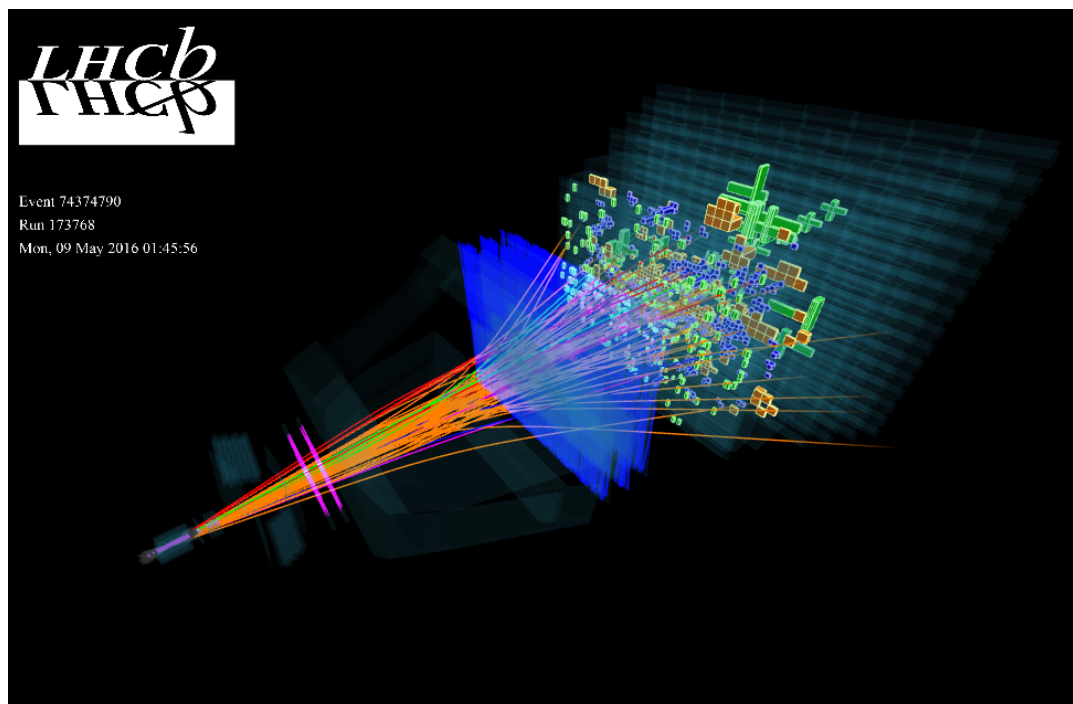
# LHCb Masterclass

- **ROOT TEve application** designed in 2013
  - Does not rely on the LHCb software stack
  - Uses a LHCb Model converted to ROOT format
  - Interactive, allows for track selection
  - Integrated with the rest of the  $D^0$  lifetime exercise
- Requires an installation of ROOT
- A Web application would be easier for the Masterclasses exercises...



# Online event display

- Online event design redesigned in 2014 (<https://lbevent.cern.ch/EventDisplay/index.html>)
  - Online service converts some events to JSON format
  - **WebGL** application by C.Langenbruch (RWTH Aachen) using **three.js** library (<https://threejs.org/>)
  - See <http://bcouturi.web.cern.ch/bcouturi/events/>
- Allows for viewing Online
- But:
  - the model is a frozen conversion to three.js format.
  - Does not allow for track selection
- Would like to reimplement the masterclass exercise using this interface



# Overall status

- Several Event displays are available adapted to the tasks at hand...
- Would be happy to modernize the frameworks
  - Moved to WebGL for the Online Event display.
  - Would like reimplement the Masterclasses exercise with WebGL (limited by the effort available to perform this development).
- For the LHCb Upgrade, we are investigating the possibility to move to DD4Hep
  - This would allow us to use the ROOT visualization tools directly.

# Future needs

- Improvements to the masterclass display have been requested
  - A web version of our Masterclass exercises would avoid deployment problems...
- Outreach and publicity plots improvements
  - We are of course interested in all new features that can improve the visualization of the events and make them more interactive for the public.
  - The current tools are not very practical to produce high quality, high resolution pictures.
- LHCb Upgrade and geometry
  - We need to improve the tools that allow debugging the Geometry, or visualize the result of track reconstruction.