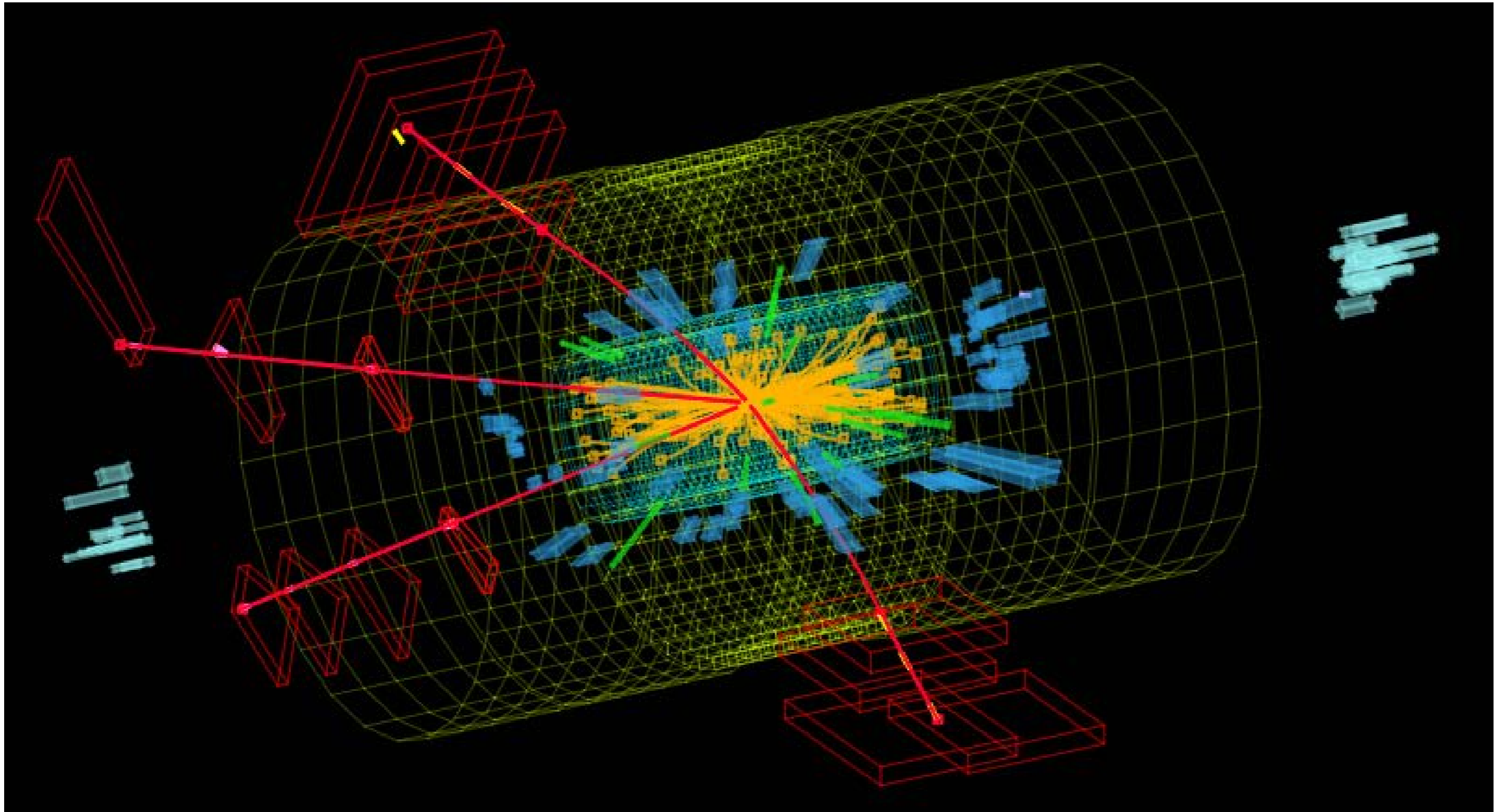




WG6 - Making use of the Open data portal



Takashi Horikoshi
from Japan

Where to find the Public data

opendata (<http://opendata.cern.ch/>) > Education

Education

Datasets



The CMS (Compact Muon Solenoid) experiment is one of two large general-purpose detectors built on the Large Hadron Collider (LHC). Its goal is to investigate a wide range of physics such as the characteristics of the

Explore CMS >



ALICE (A Large Ion Collider Experiment) is a heavy-ion detector designed to study the physics of strongly interacting matter at extreme energy densities, where a phase of matter called **quark-gluon plasma** forms.

Explore ALICE >



The ATLAS (A Toroidal LHC ApparatuS) experiment is a general purpose detector exploring topics like the properties of the Higgs-like particle, extra dimensions of space, unification of fundamental forces, and

Explore ATLAS >

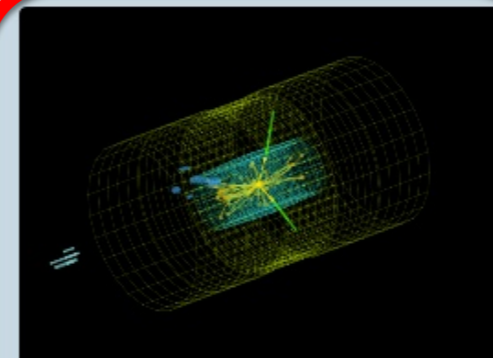


The LHCb (Large Hadron Collider beauty) experiment aims to record the decay of particles containing b and anti-b quarks, known as B mesons. The detector is designed to gather information about the identity,

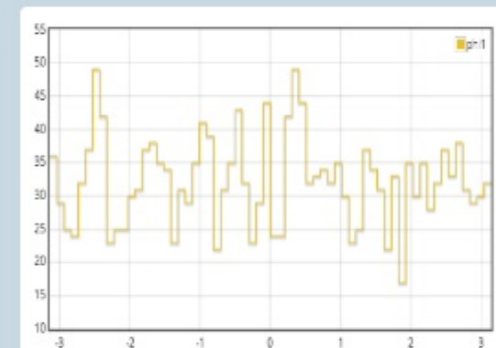
Explore LHCb >

For education purposes, the complex primary data need to be processed into a format (examples below) that is good for simple applications. Get in touch if you wish to build your own applications similar to those shown here

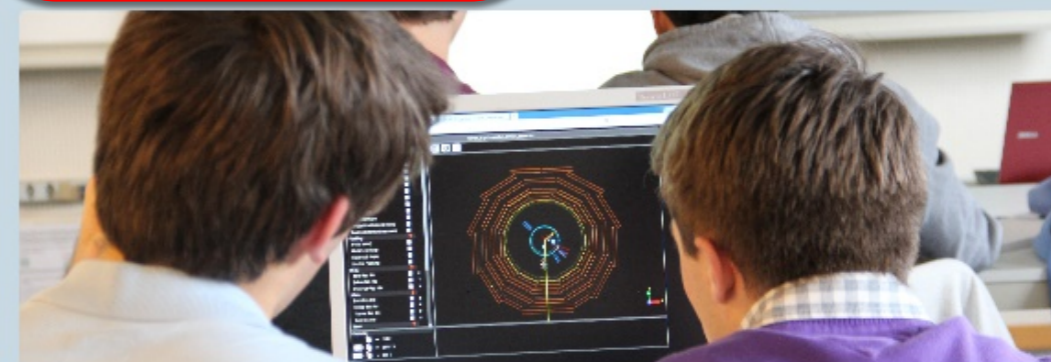
Event display



Visualise events >

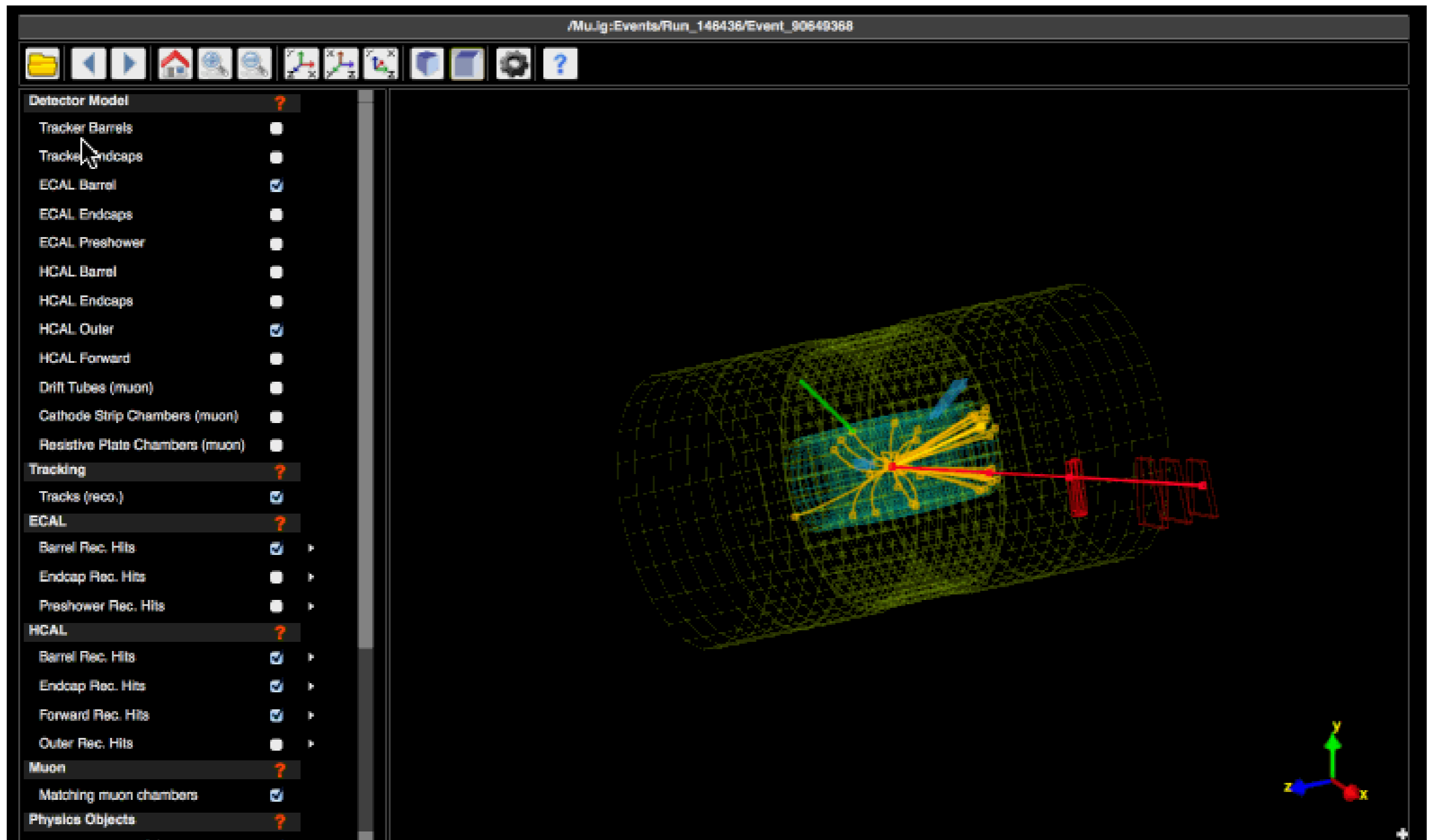


Visualise histograms >

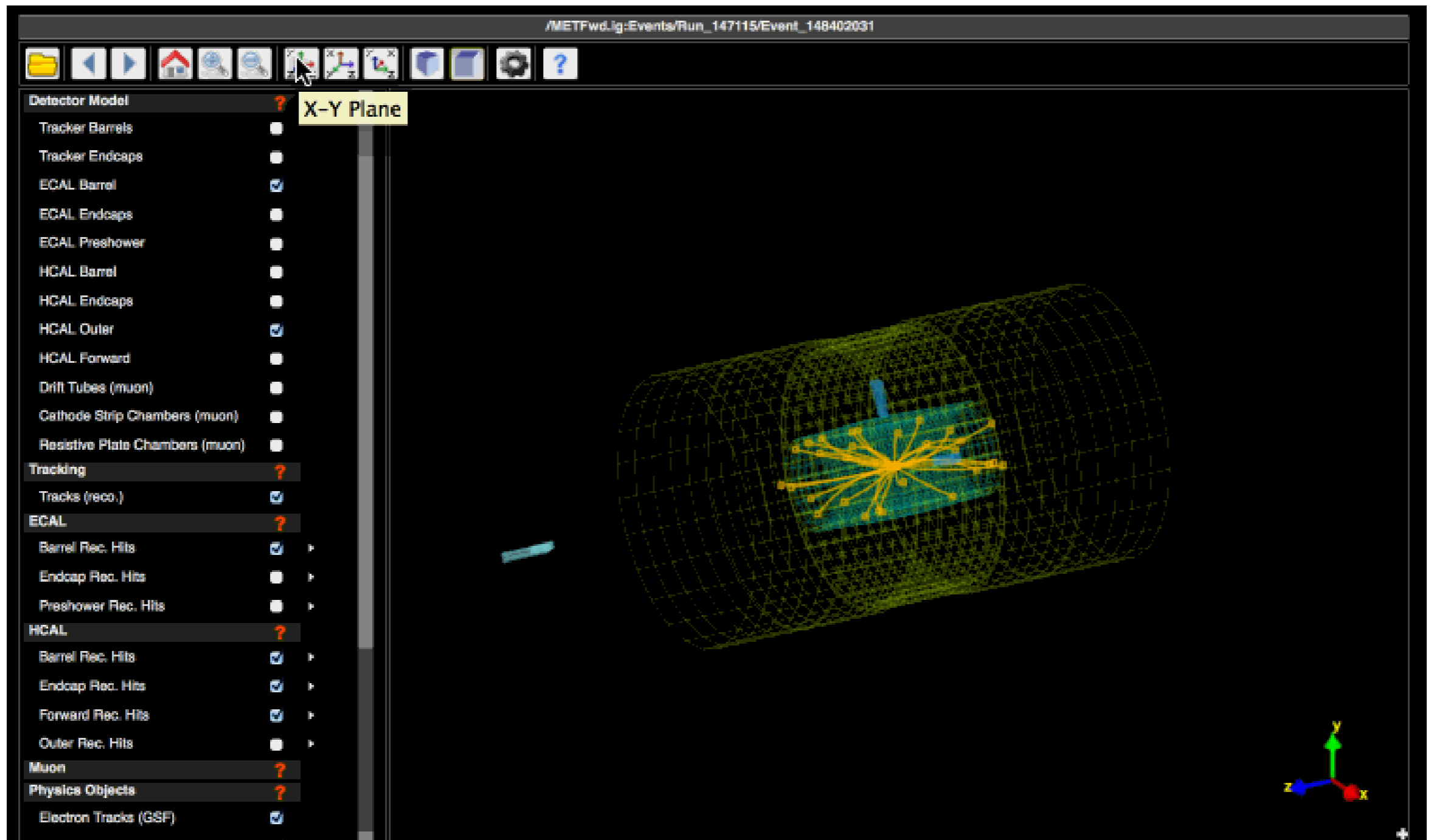


Learning Resources >

Open the event files



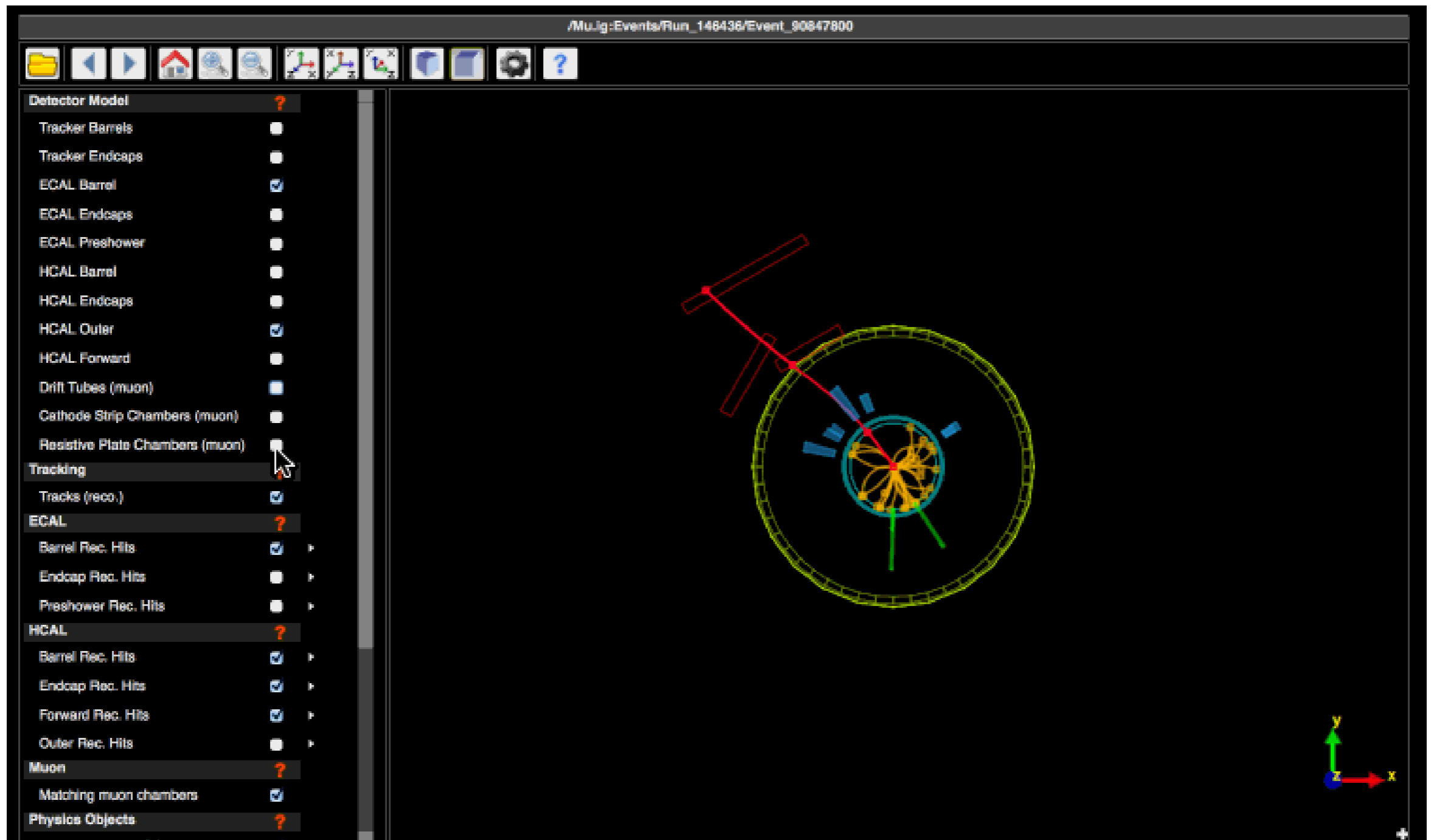
View the collision event from all angles





Event display

Show or hide the CMS sub-detectors , tracks , and more





Where to download clean data

opendata > Education > CMS > CMS Derived Datasets

🏠 > CMS > CMS Derived Datasets

CMS Derived Datasets

This collection includes data that have been derived from the CMS primary datasets. The data may be reduced in the sense that (a) only part of the information is kept or (b) only part of the events are selected. Datasets include those which may be accessed using the VM image of the CMS environment or those which are adapted for other tools and applications. The tools and instructions to access and use these data are linked to each record.

Dimuon event information derived from the Run2010B public Mu dataset

This document contains 100k dimuon events selected from the Mu dataset from Run2010B.
Each line corresponds to an event. The main file contains all 100k events

Collection CMS-Derived-Datasets Author McCauley, Thomas

DOI 10.7483/OPENDATA.CMS.CB8H.MFFA Parent Dataset AOD/Mu/Run-2010B-Apr21ReReco-v1/

download **“MuRun2010B.csv” !!**



File format

MuRun2010B.csv

- This document contain the **100,000 dimuon event data !**
- Dimuon is a one of a high-quality “global” muon.

Energy (particle1)

Momentum (particle1)

Mass

	D	E	F	G	M	N	O	P	U
1	E1	px1	py1	pz1	E2	px2	py2	pz2	M
2	19.1712	3.81713	9.04323	-16.4673	5.43984	-0.362592	2.62699	-4.74849	2.72205
3	12.9435	5.12579	-3.98369	-11.1973	11.8636	4.78984	-6.26222	-8.86434	2.10256
4	12.3999	-0.849742	9.4011	8.04015	8.55532	-4.85155	6.97696	-0.983229	9.41149

Energy (particle2) Momentum (particle2)



Reconstruct Particle

Energy-Momentum conservation ($X \rightarrow A + B$)

$$E_X = E_A + E_B \qquad \mathbf{p}_X = \mathbf{p}_A + \mathbf{p}_B$$

Theory of relativity

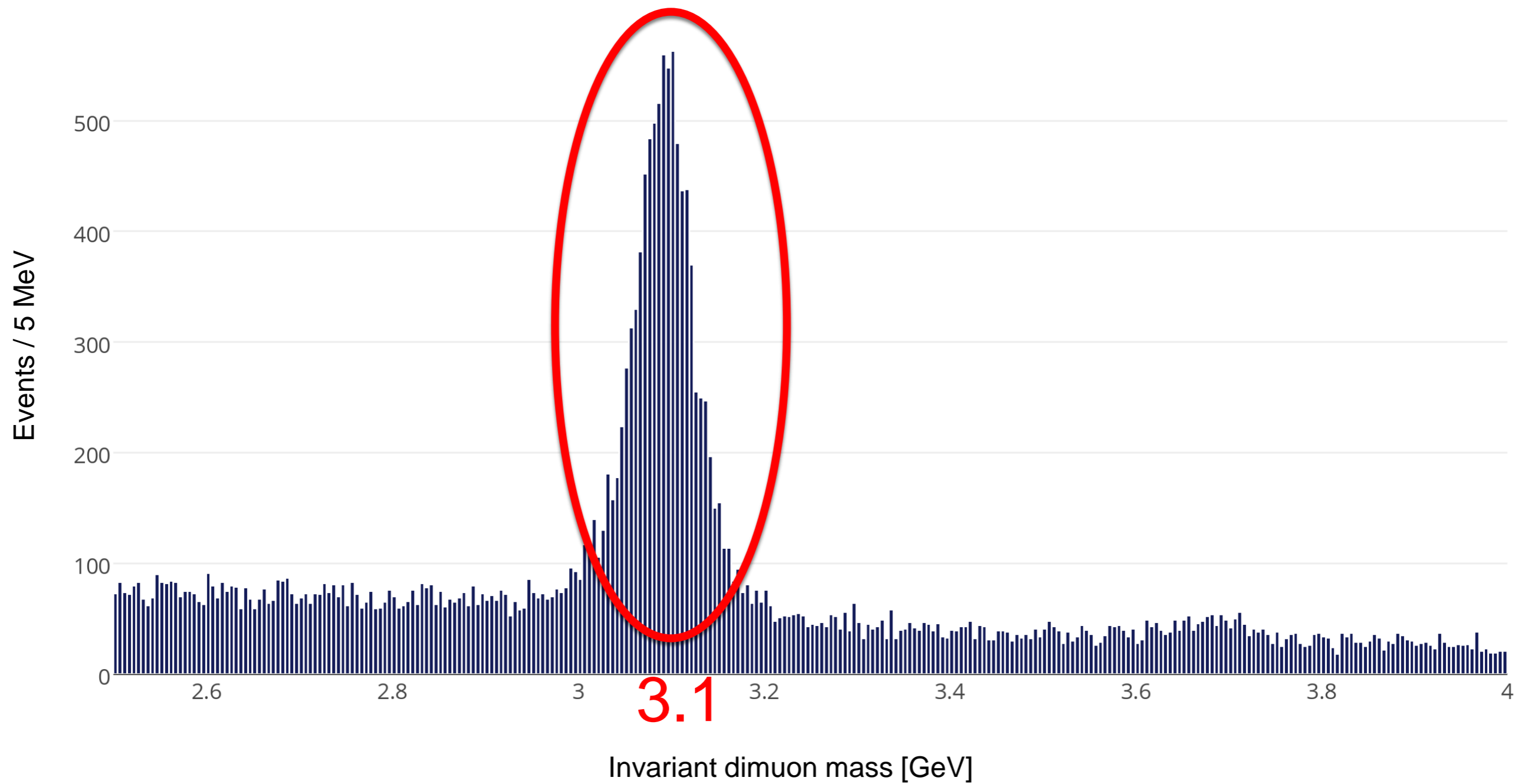
$$E^2 = p^2 c^2 + m^2 c^4$$

Mass from

$$m_X = \frac{1}{c^2} \sqrt{(E_A + E_B)^2 - (\mathbf{p}_A + \mathbf{p}_B)^2 c^2}$$



Results for J/ψ





Higgs candidate events

Higgs candidate events for use in education and outreach

Search “CMS Higgs” !

The screenshot shows the OpenData CERN website interface. At the top left is the 'opendata CERN' logo. To the right are navigation links: 'ABOUT', 'SEARCH', 'EDUCATION', and 'RESEARCH'. A search bar contains the text 'CMS Higgs' and a 'Search' button with a magnifying glass icon. A red arrow points from the text 'Search “CMS Higgs” !' to the search button. Below the search bar, a sidebar on the left shows 'Any Collection' with 'CMS Derived Datasets (2)'. The main content area displays 'Showing records 1 to 2 out of 2 results.' and a single result card for 'Higgs candidate events for use in education and outreach'. The result card includes a description: 'This document contains Higgs candidate events (with an invariant mass between 120-130 GeV) that have been released by CMS for use in education and outreach: 10 gamma-gamma events, one 2e2mu event, one 4mu event, and one 4e event.' Below the description are metadata fields: 'Collection CMS-Derived-Datasets', 'Author McCauley, Thomas', and 'DOI 10.7483/OPENDATA.CMS.N9MJ.QEEC'. A red rounded rectangle highlights the entire result card.

opendata CERN

ABOUT SEARCH EDUCATION RESEARCH

CMS Higgs Search

Any Collection

CMS Derived Datasets (2)

Showing records 1 to 2 out of 2 results.

Higgs candidate events for use in education and outreach

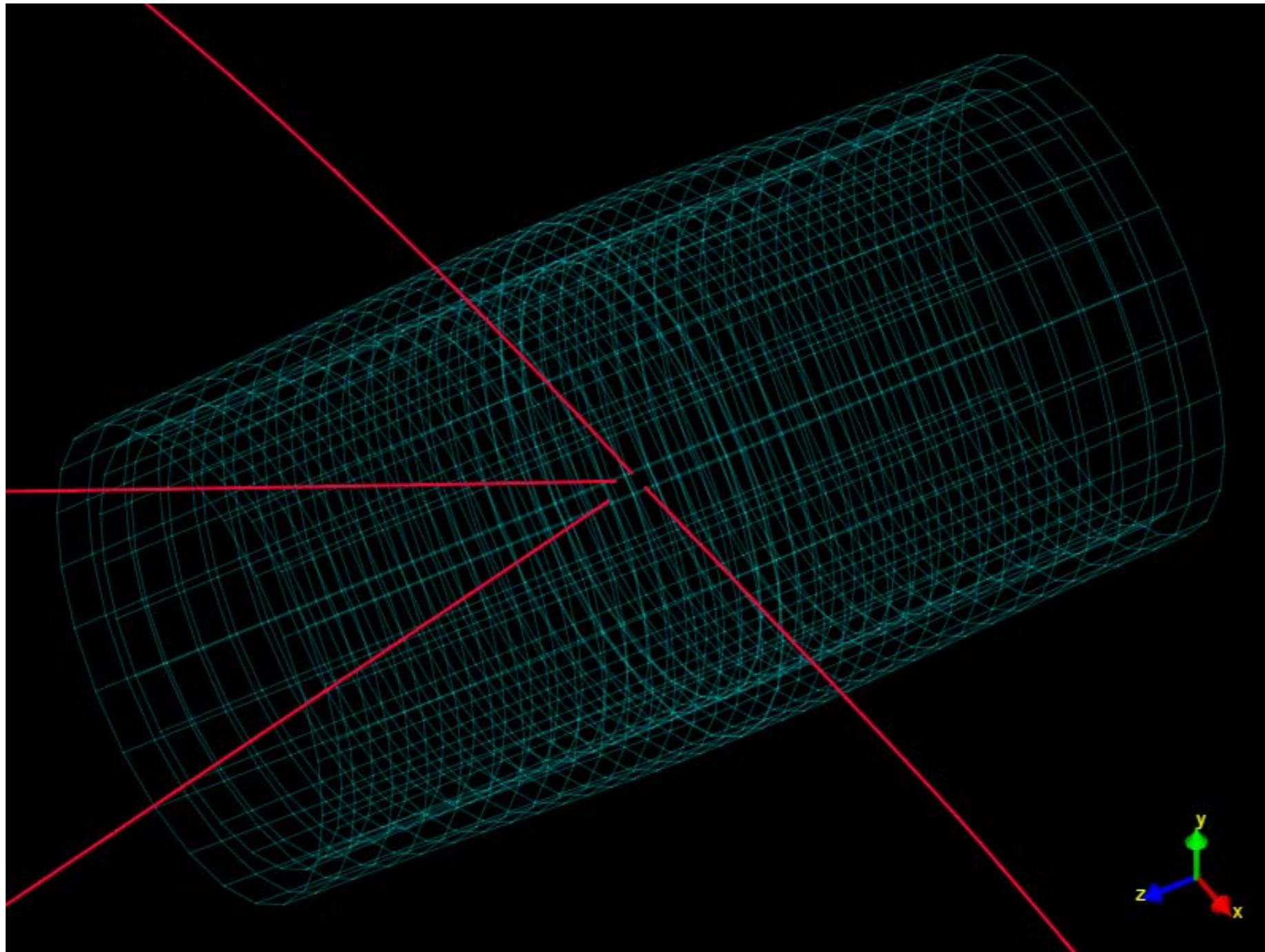
This document contains Higgs candidate events (with an invariant mass between 120-130 GeV) that have been released by CMS for use in education and outreach: 10 gamma-gamma events, one 2e2mu event, one 4mu event, and one 4e event.

Collection CMS-Derived-Datasets Author McCauley, Thomas

DOI 10.7483/OPENDATA.CMS.N9MJ.QEEC

Higgs candidate events

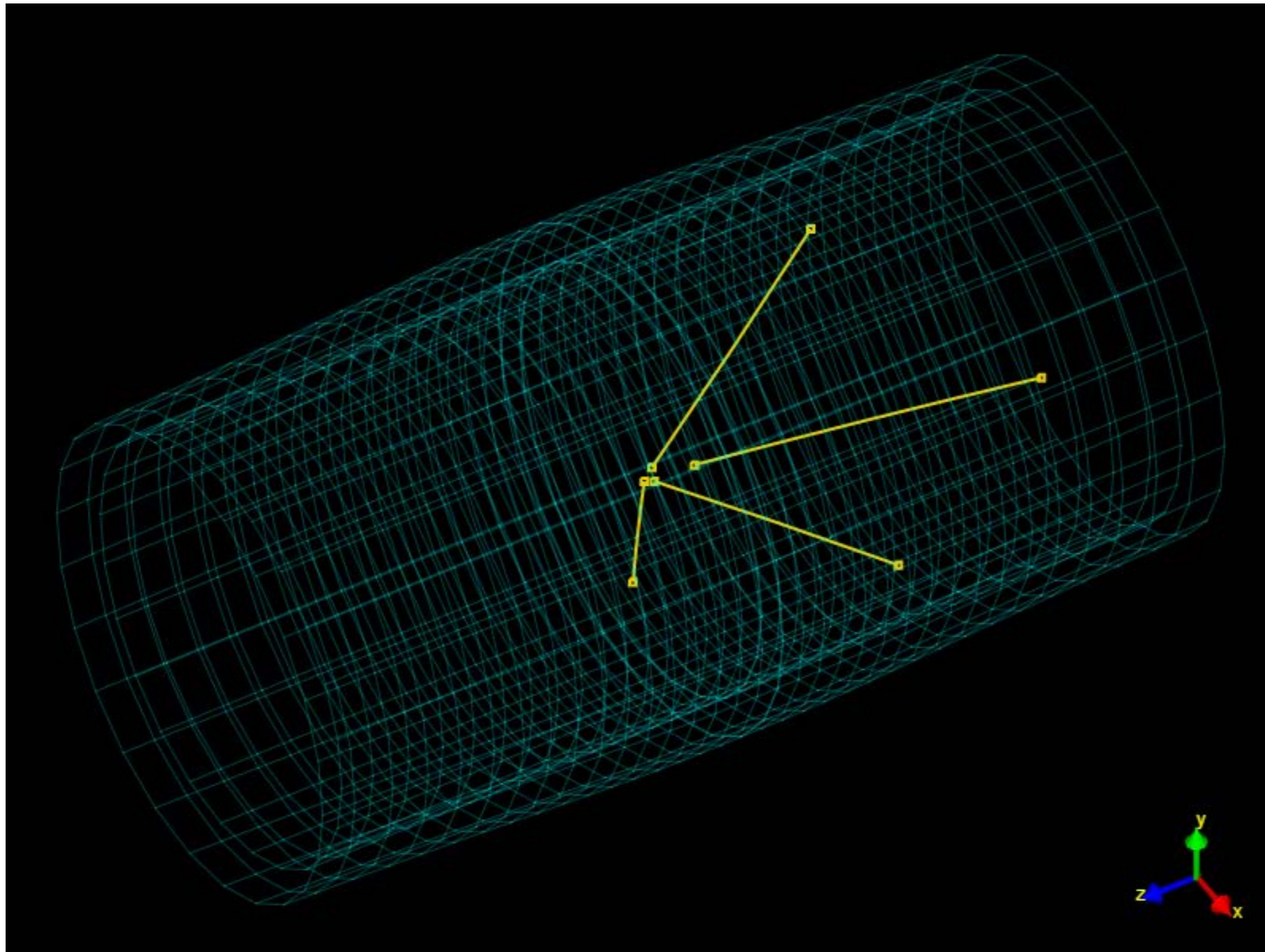
$$H \rightarrow \mu^+ \mu^- \mu^+ \mu^-$$





Higgs candidate events

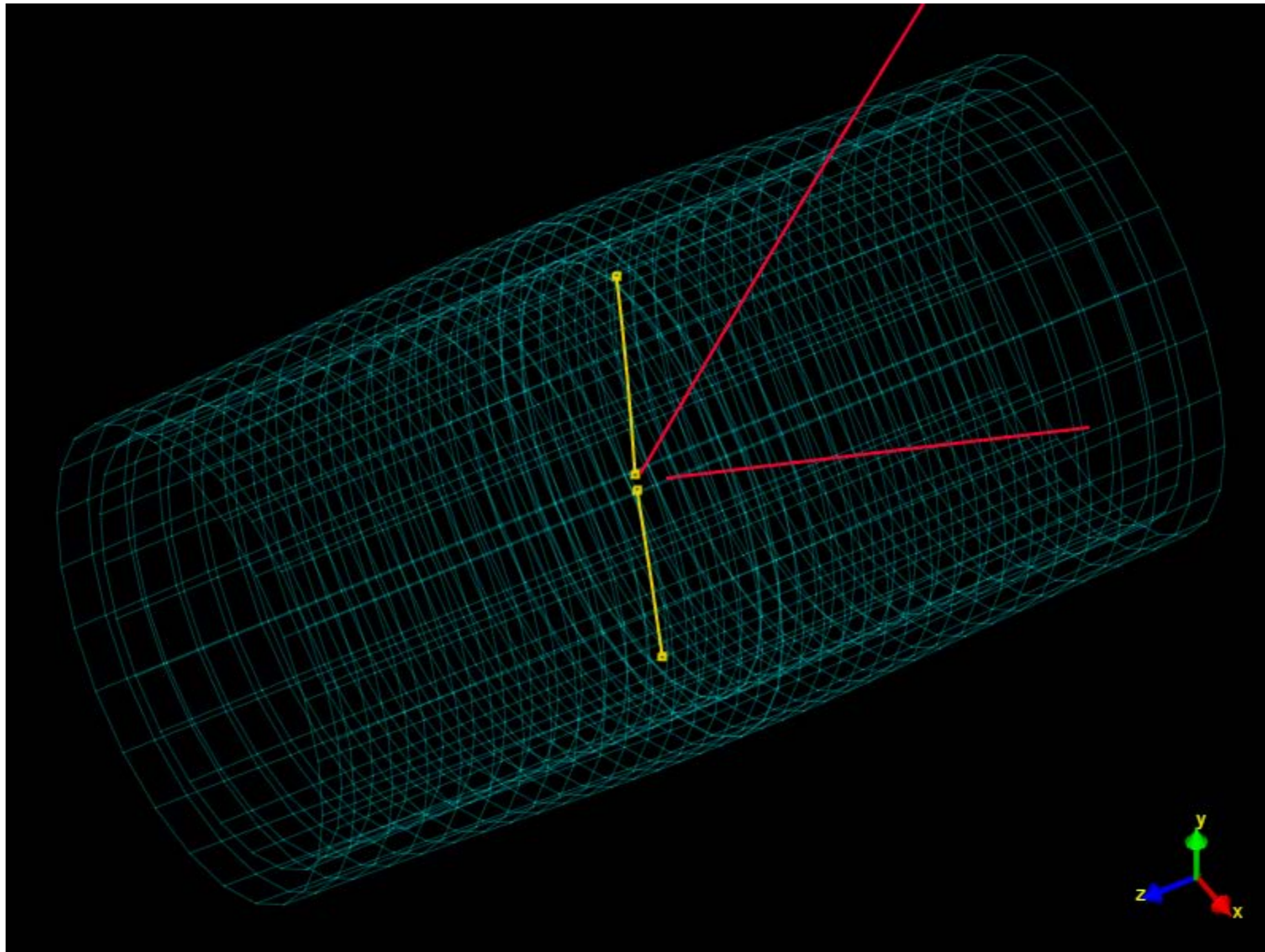
$$H \rightarrow e^+ e^- e^+ e^-$$





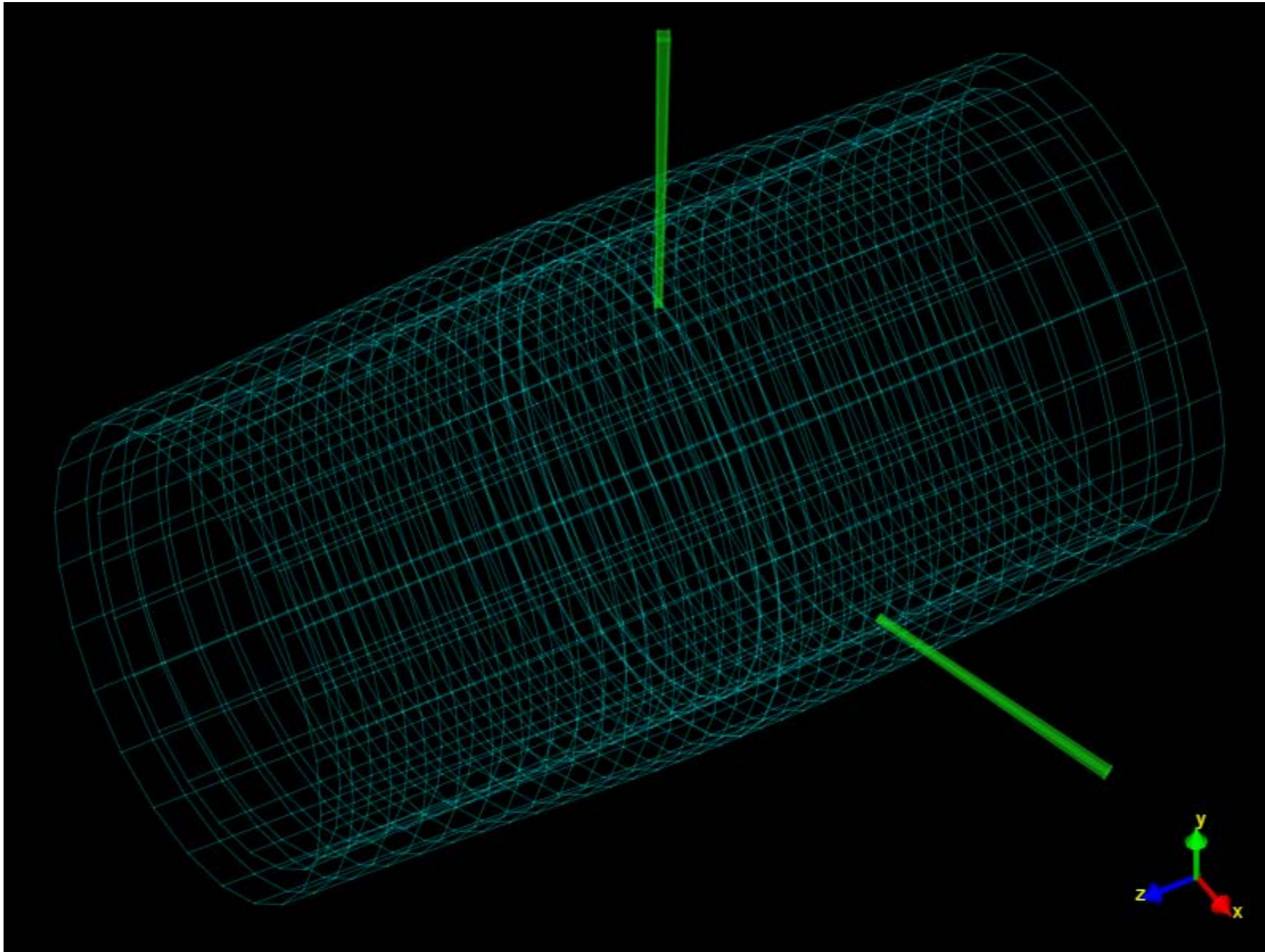
Higgs candidate events

$$H \rightarrow e^+ e^- \mu^+ \mu^-$$



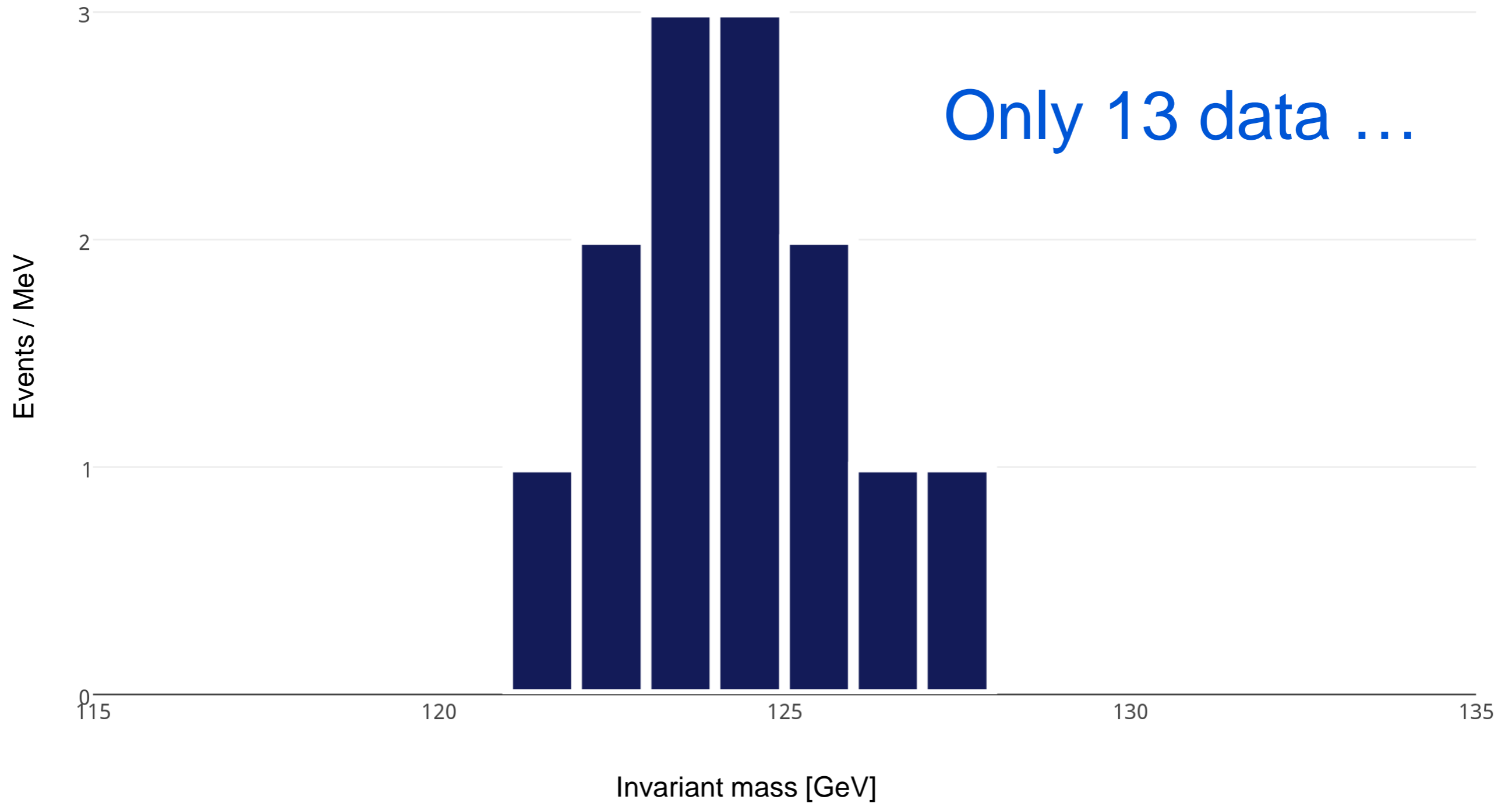
Higgs candidate events

$$H \rightarrow \gamma \gamma$$





Results for Higgs



Thank you for attention !

