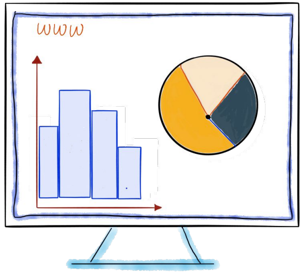
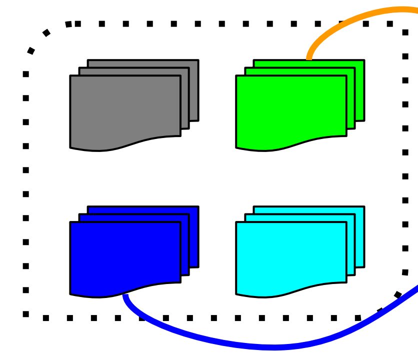
ESCAPE: a view of RUCIO + JupyterLab + ATLAS Open Data integration

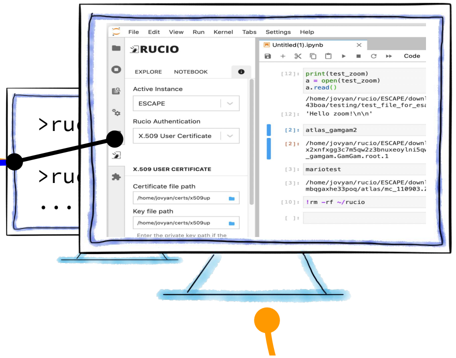


Arturo Sánchez Pineda

5th March 2021, LAPP



Data Lake and stored ATLAS OD datasets



Active Instance: ESCAPE

Rucio Authentication: X.509 User Certificate

X.509 USER CERTIFICATE

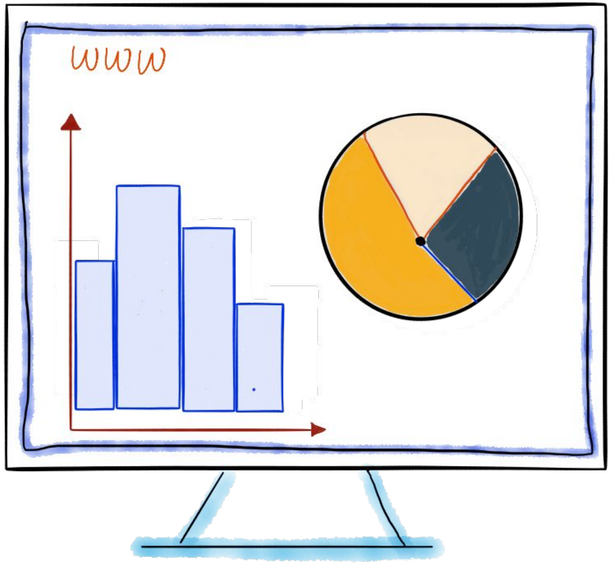
Certificate file path: /home/jovyan/certs/x509up

Key file path: /home/jovyan/certs/x509up

Enter the private key path if the

```
[12]: print(test_zoom)
      a = open(test_zoom)
      a.read()
      /home/jovyan/rucio/ESCAPE/downl
      43boa/testing/test_file_for_esa
[12]: 'Hello zoom!\n\n'

[2]:  atlas_gamgam2
[2]:  /home/jovyan/rucio/ESCAPE/downl
      x2xnfxgg3c7m5qw2z3bnuxeoylni5qw
      _gamgam.GamGam.root.1

[3]:  mariotest
[3]:  /home/jovyan/rucio/ESCAPE/downl
      mbqgaxhe33poq/atlas/mc_110903.z

[10]: !rm -rf ~/rucio

[ ]:
```

RUCIO + JupyterLab with ATLAS open data notebooks for testing



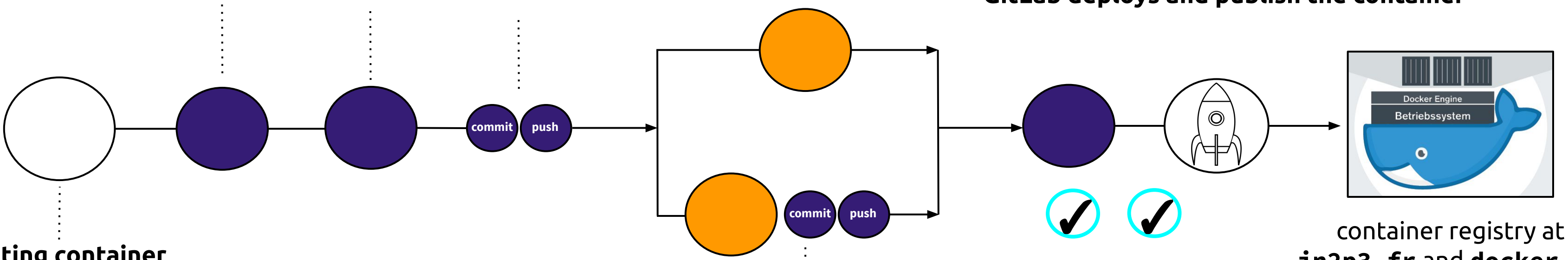
Analysis code, results and visualisation

https://github.com/rucio/jupyterlab-extension
https://github.com/atlas-outreach-data-tools/notebooks-collection-opendata

A view of the service

Work at LAPP

A very first view to the current container



current **`.gitlab-ci.yml`** to build & deploy

write / update code

Add, commit, and push

GitLab deploys and publish the container

Existing container

container registry at
`in2p3.fr` and **`docker.io`**

updates goes in the **`.gitlab-ci.yml`**

Container CI / CD

- The series of resources is package in a single container
- The CI setup automatically handles the publication of the container

Frédéric & Berkay’s job

Several developments and deployment already in place

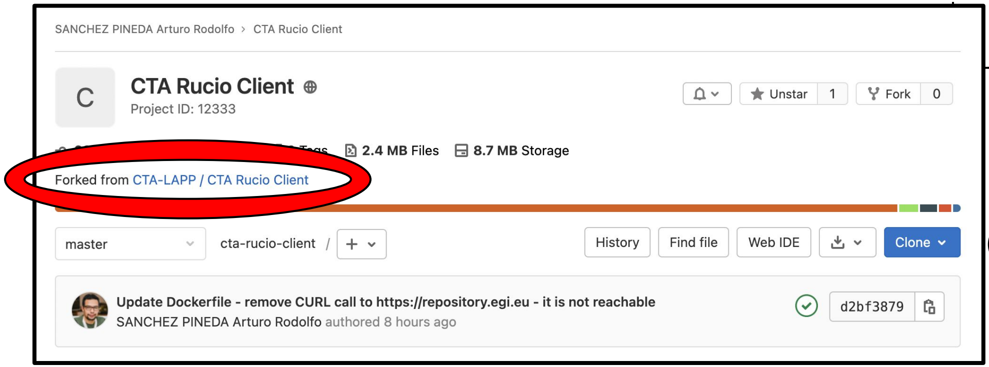
- The compendium of resources includes the current rucio client + JupyterLab + RUCIO extension, proxy & authentication, ...

A very first view to the current container

current **`.gitlab-ci.yml`** to build & deploy

write / update code

Add, commit, and push



SANCHEZ PINEDA Arturo Rodolfo › CTA Rucio Client

C

CTA Rucio Client

Project ID: 12333

Unstar 1 Fork 0

Tags 2.4 MB Files 8.7 MB Storage

Forked from CTA-LAPP / CTA Rucio Client

master cta-rucio-client / +

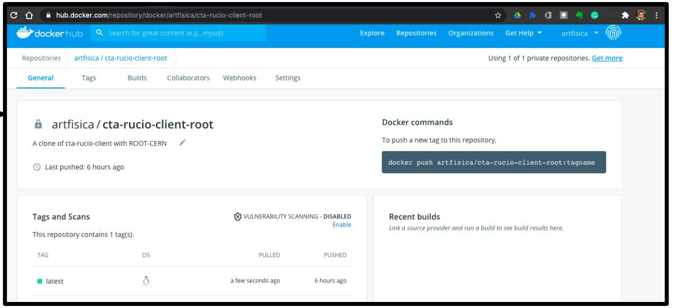
History Find file Web IDE Clone

Update Dockerfile - remove CURL call to https://repository.egi.eu - it is not reachable
SANCHEZ PINEDA Arturo Rodolfo authored 8 hours ago

d2bf3879

push

GitLab deploys and publish the container



hub.docker.com/repository/docker/artfisica/cta-rucio-client-root

Using 1 of 1 private repositories. Get more

artfisica / cta-rucio-client-root

A clone of cta-rucio-client with ROOT-CERN

Last pushed: 6 hours ago

Docker commands

To push a new tag to this repository,

```
docker push artfisica/cta-rucio-client-root:tagname
```

Tags and Scans

VULNERABILITY SCANNING - DISABLED
Enable

This repository contains 1 tag(s).

TAG	OS	PULLED	PUSHED
latest		a few seconds ago	6 hours ago

Recent builds

Link a source provider and run a build to see build results here.

updates goes in the **`.gitlab-ci.yml`**

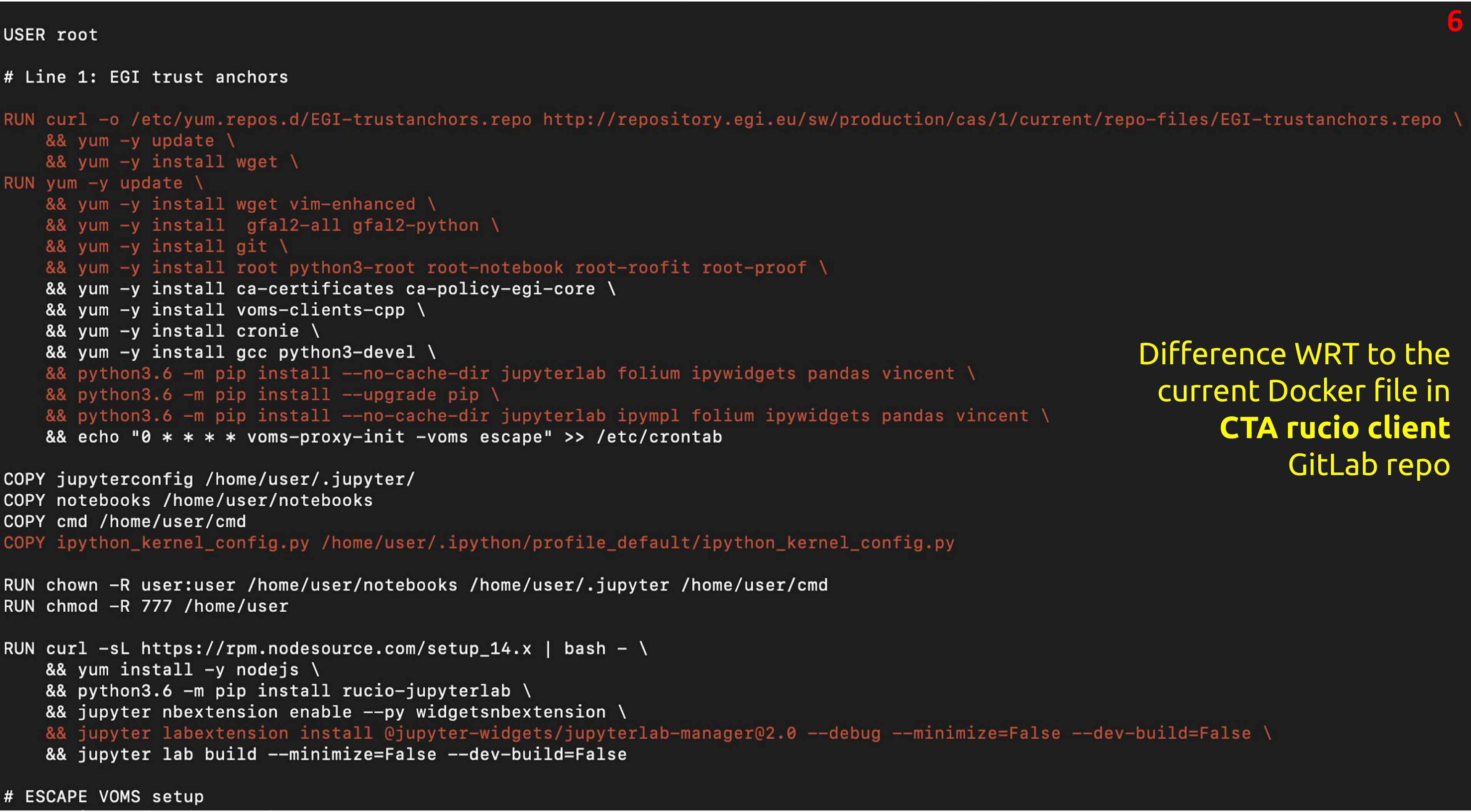
Container CI / CD

- The series of resources is package in a single container
- The CI setup automatically handles the publication of the container

Arturo profiting from Frédéric & Berkay's job

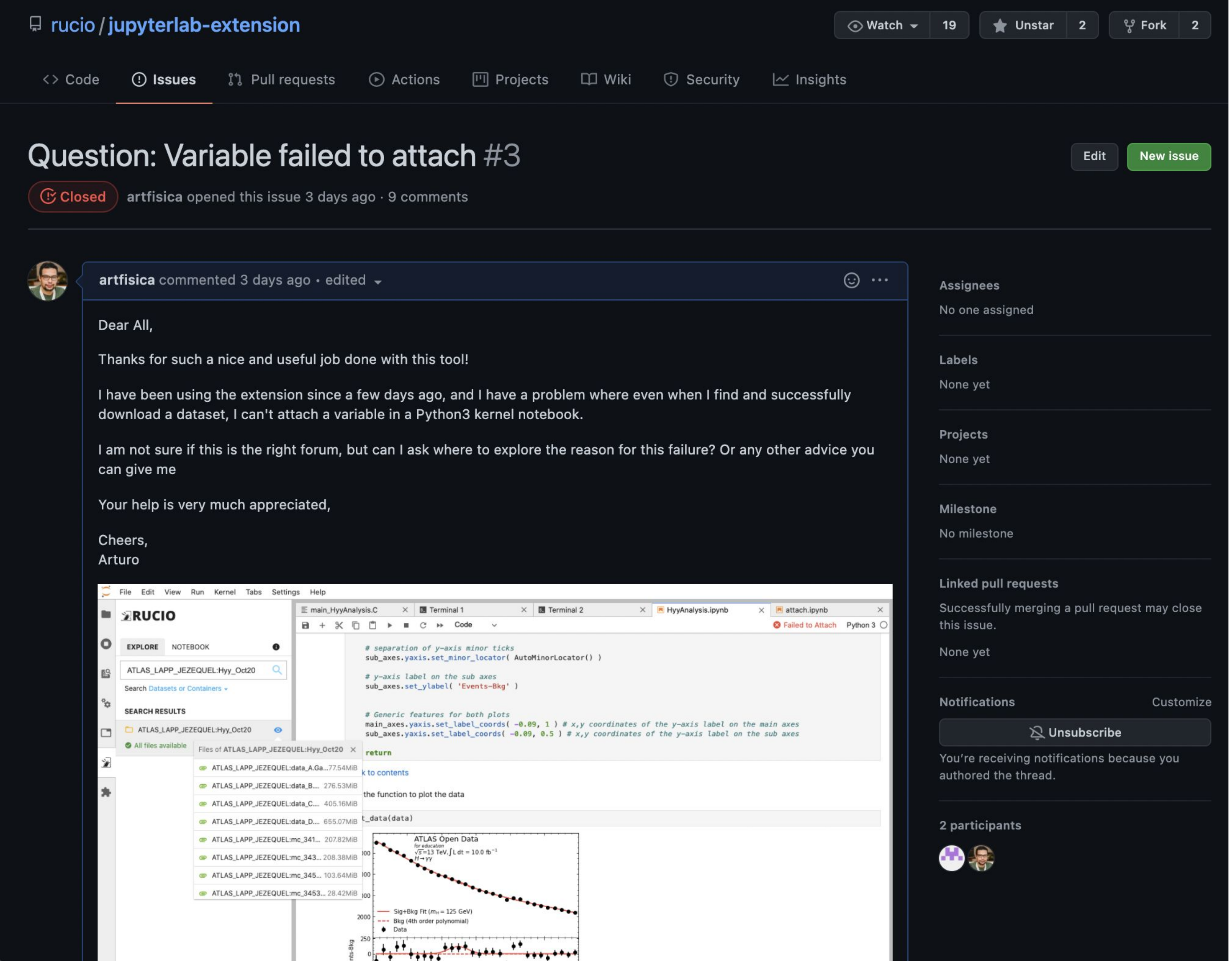
Several tools and updates added

- Mainly ROOT + some dependencies and extra tools…
- Jupyter conf file to handle the usage of the rucio extension (Muhammad feedback, see later)
- From JupyterLab-3 the widgets are installed using ipywidgets instead of labextension



```
USER root

# Line 1: EGI trust anchors

RUN curl -o /etc/yum.repos.d/EGI-trustanchors.repo http://repository.egi.eu/sw/production/cas/1/current/repo-files/EGI-trustanchors.repo \
    && yum -y update \
    && yum -y install wget \
RUN yum -y update \
    && yum -y install wget vim-enhanced \
    && yum -y install  gfal2-all gfal2-python \
    && yum -y install git \
    && yum -y install root python3-root root-notebook root-roofit root-proof \
    && yum -y install ca-certificates ca-policy-egi-core \
    && yum -y install voms-clients-cpp \
    && yum -y install cronie \
    && yum -y install gcc python3-devel \
    && python3.6 -m pip install --no-cache-dir jupyterlab folium ipywidgets pandas vincent \
    && python3.6 -m pip install --upgrade pip \
    && python3.6 -m pip install --no-cache-dir jupyterlab ipympl folium ipywidgets pandas vincent \
    && echo "0 * * * * voms-proxy-init -voms escape" >> /etc/crontab

COPY jupyterconfig /home/user/.jupyter/
COPY notebooks /home/user/notebooks
COPY cmd /home/user/cmd
COPY ipython_kernel_config.py /home/user/.ipython/profile_default/ipython_kernel_config.py

RUN chown -R user:user /home/user/notebooks /home/user/.jupyter /home/user/cmd
RUN chmod -R 777 /home/user

RUN curl -sL https://rpm.nodesource.com/setup_14.x | bash - \
    && yum install -y nodejs \
    && python3.6 -m pip install rucio-jupyterlab \
    && jupyter nbextension enable --py widgetsnbextension \
    && jupyter labextension install @jupyter-widgets/jupyterlab-manager@2.0 --debug --minimize=False --dev-build=False \
    && jupyter lab build --minimize=False --dev-build=False

# ESCAPE VOMS setup
```

Difference WRT to the current Docker file in **CTA rucio client** GitLab repo



Question: Variable failed to attach #3

Closed artfisica opened this issue 3 days ago · 9 comments

artfisica commented 3 days ago • edited

Dear All,

Thanks for such a nice and useful job done with this tool!

I have been using the extension since a few days ago, and I have a problem where even when I find and successfully download a dataset, I can't attach a variable in a Python3 kernel notebook.

I am not sure if this is the right forum, but can I ask where to explore the reason for this failure? Or any other advice you can give me

Your help is very much appreciated,

Cheers,
Arturo

ATLAS_LAPP_JEZEQUEL:Hyy_Oct20

Search Datasets or Containers

SEARCH RESULTS

ATLAS_LAPP_JEZEQUEL:Hyy_Oct20

All files available

Files of ATLAS_LAPP_JEZEQUEL:Hyy_Oct20

ATLAS_LAPP_JEZEQUEL:data_A.Ga...	77.54MiB
ATLAS_LAPP_JEZEQUEL:data_B....	276.53MiB
ATLAS_LAPP_JEZEQUEL:data_C....	405.16MiB
ATLAS_LAPP_JEZEQUEL:data_D....	655.07MiB
ATLAS_LAPP_JEZEQUEL:mc_341...	207.82MiB
ATLAS_LAPP_JEZEQUEL:mc_343...	208.38MiB
ATLAS_LAPP_JEZEQUEL:mc_345...	103.64MiB
ATLAS_LAPP_JEZEQUEL:mc_3453...	28.42MiB

```
# separation of y-axis minor ticks
sub_axes.yaxis.set_minor_locator( AutoMinorLocator() )

# y-axis label on the sub axes
sub_axes.set_ylabel( 'Events-Bkg' )


# Generic features for both plots
main_axes.yaxis.set_label_coords( -0.09, 1 ) # x,y coordinates of the y-axis label on the main axes
sub_axes.yaxis.set_label_coords( -0.09, 0.5 ) # x,y coordinates of the y-axis label on the sub axes

return
```

k to contents

the function to plot the data

```
t_data(data)
```

ATLAS Open Data
for education
$\sqrt{s}$=13 TeV,$\int$L dt = 10.0 fb^{-1}
$H \rightarrow \gamma\gamma$
Sig+Bkg Fit (m_H = 125 GeV)
Bkg (4th order polynomial)
Data
2000
250
0

Assignees

No one assigned

Labels

None yet

Projects

None yet

Milestone

No milestone

Linked pull requests

Successfully merging a pull request may close this issue.

None yet

Notifications

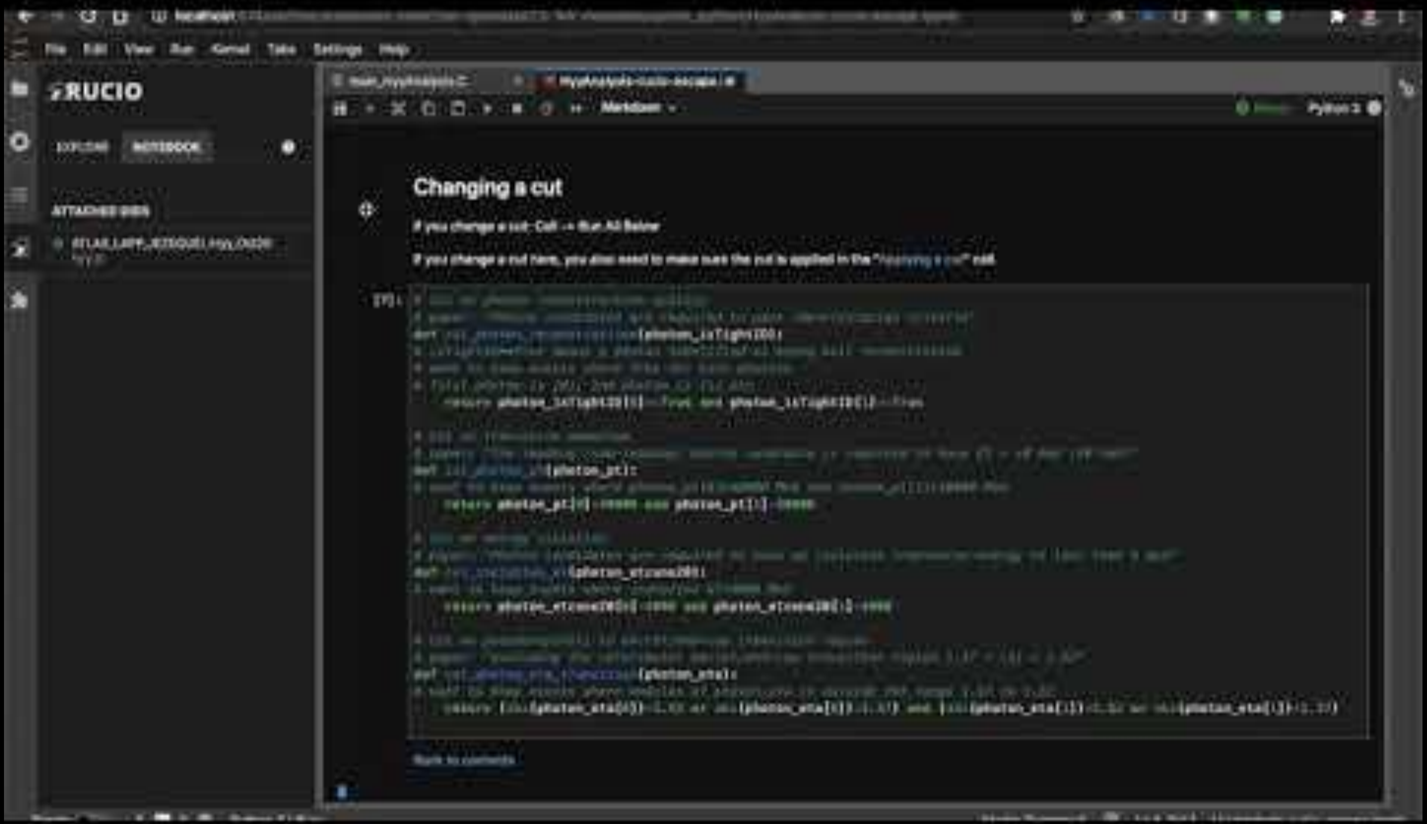
Customize

You're receiving notifications because you authored the thread.

2 participants

Getting help from Muhammand
https://github.com/rucio/jupyterlab-extension/issues/3

RUCIO client +
JupyterLab
ATLAS Open Data



Changing a cut

If you change a cut: Cell -> Run All Below

If you change a cut here, you also need to make sure the cut is applied in the "[illegible]" cell.

```
[7]:
# [illegible]
# [illegible]
def [illegible](photon_isTightID):
# [illegible]
# [illegible]
# [illegible]
    return photon_isTightID[0]==True and photon_isTightID[1]==True

# [illegible]
# [illegible]
def [illegible](photon_pt):
# [illegible]
    return photon_pt[0]>[illegible] and photon_pt[1]>[illegible]

# [illegible]
# [illegible]
def [illegible](photon_etcone20):
# [illegible]
    return photon_etcone20[0]<[illegible] and photon_etcone20[1]<[illegible]

# [illegible]
# [illegible]
def [illegible](photon_eta):
# [illegible]
    return (abs(photon_eta[0])<[illegible] or abs(photon_eta[0])>[illegible]) and (abs(photon_eta[1])<[illegible] or abs(photon_eta[1])>[illegible])
```

Back to contents

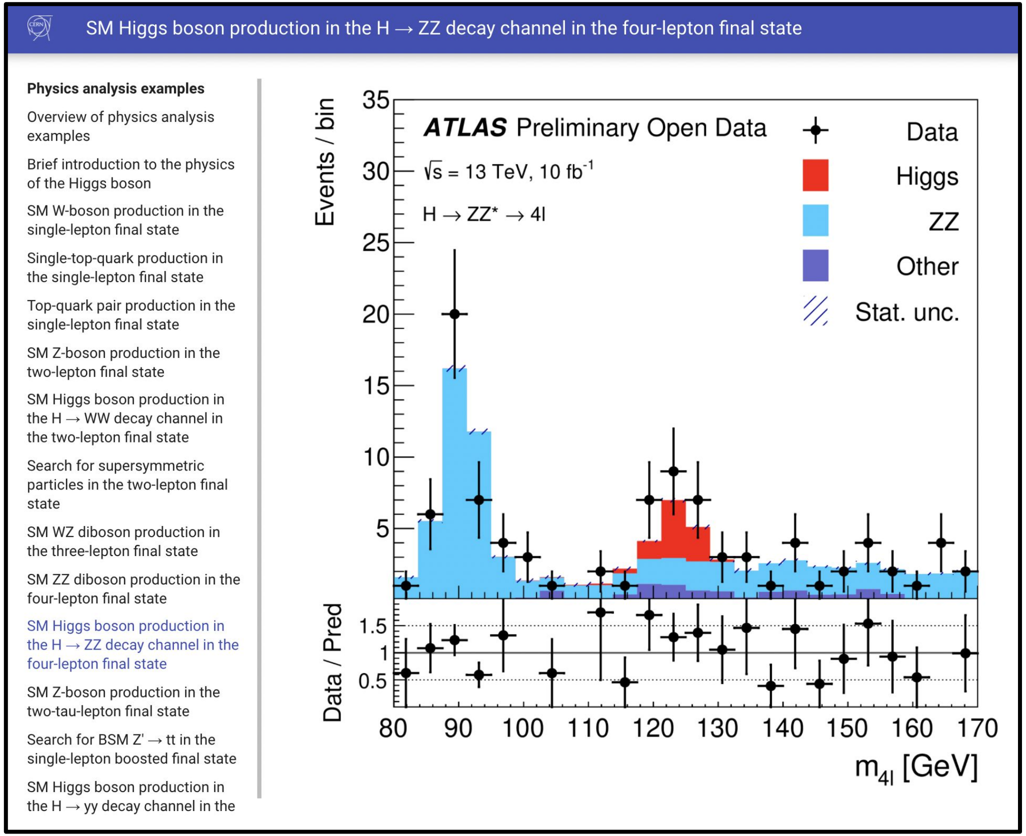
Watch video here
https://www.youtube.com/watch?v=iLT3FkZbH9o

Ongoing→ ATLAS Open Data as a test field

To run the C++ analyses

More computational complex particle physics analysis using the existing publicly available data

More in Opendata.atlas.cern - documentation 13 TeV - physics.



SM Higgs boson production in the H → ZZ decay channel in the four-lepton final state

Physics analysis examples

Overview of physics analysis examples

Brief introduction to the physics of the Higgs boson

SM W-boson production in the single-lepton final state

Single-top-quark production in the single-lepton final state

Top-quark pair production in the single-lepton final state

SM Z-boson production in the two-lepton final state

SM Higgs boson production in the H → WW decay channel in the two-lepton final state

Search for supersymmetric particles in the two-lepton final state

SM WZ diboson production in the three-lepton final state

SM ZZ diboson production in the four-lepton final state

SM Higgs boson production in the H → ZZ decay channel in the four-lepton final state

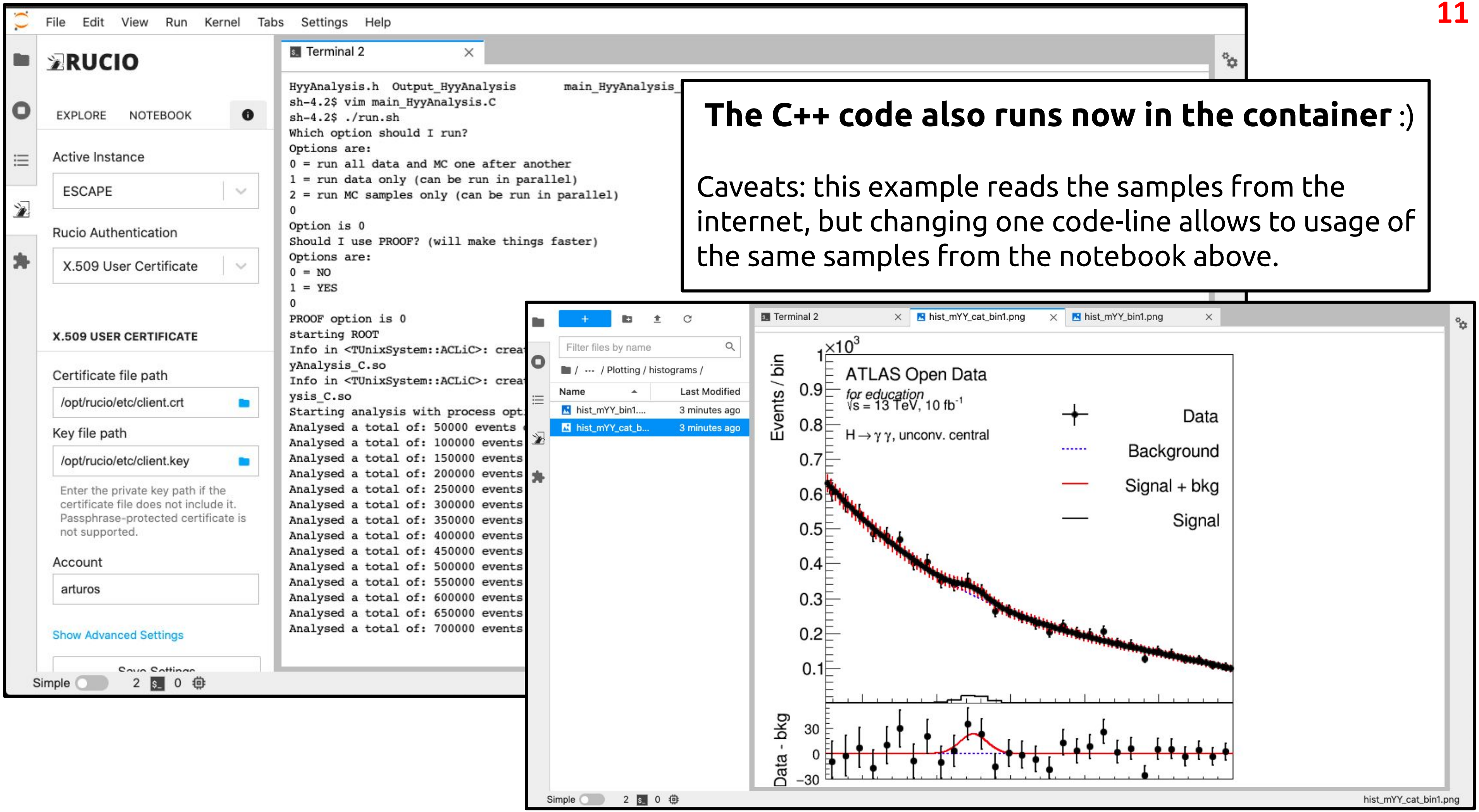
SM Z-boson production in the two-tau-lepton final state

Search for BSM Z' → tt in the single-lepton boosted final state

SM Higgs boson production in the H → yy decay channel in the

The C++ code also runs now in the container :)

Caveats: this example reads the samples from the internet, but changing one code-line allows to usage of the same samples from the notebook above.



Active Instance
ESCAPE

Rucio Authentication
X.509 User Certificate

X.509 USER CERTIFICATE

Certificate file path
/opt/rucio/etc/client.crt

Key file path
/opt/rucio/etc/client.key

Enter the private key path if the certificate file does not include it. Passphrase-protected certificate is not supported.

Account
arturos

Show Advanced Settings

Save Settings

```
HyyAnalysis.h  Output_HyyAnalysis      main_HyyAnalysis_
sh-4.2$ vim main_HyyAnalysis.C
sh-4.2$ ./run.sh
Which option should I run?
Options are:
0 = run all data and MC one after another
1 = run data only (can be run in parallel)
2 = run MC samples only (can be run in parallel)
0
Option is 0
Should I use PROOF? (will make things faster)
Options are:
0 = NO
1 = YES
0
PROOF option is 0
starting ROOT
Info in <TUnixSystem::ACLiC>: crea
yAnalysis_C.so
Info in <TUnixSystem::ACLiC>: crea
ysis_C.so
Starting analysis with process opt
Analysed a total of: 50000 events
Analysed a total of: 100000 events
Analysed a total of: 150000 events
Analysed a total of: 200000 events
Analysed a total of: 250000 events
Analysed a total of: 300000 events
Analysed a total of: 350000 events
Analysed a total of: 400000 events
Analysed a total of: 450000 events
Analysed a total of: 500000 events
Analysed a total of: 550000 events
Analysed a total of: 600000 events
Analysed a total of: 650000 events
Analysed a total of: 700000 events
```

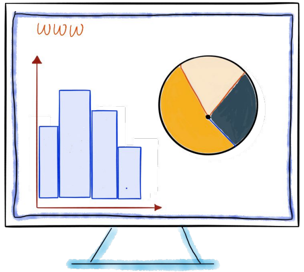
/ … / Plotting / histograms /

Name	Last Modified
hist_mYY_bin1....	3 minutes ago
hist_mYY_cat_b...	3 minutes ago

Next objective→ **how to run the examples without download the samples**

(below some previous presentations)

ESCAPE: a view of RUCIO + JupyterLab + ATLAS Open Data integration



Arturo Sánchez Pineda

1st February 2021, LAPP (virtual & updated)

Overview

This is a first attempt to summarise the activities relative to *a* integration and consolidation of the Data Lake via RUCIO and a friendly web-based UI like JupyterLab, and the efforts to consolidate those in a single entity (container).

And how ATLAS Open Data is used as a Test for such technology and integrations.

Caveats

Since I am new to the project and team, I may not have the proper jargon of clear concepts, yet. Any feedback is very welcome :)

The user’s context

In this case, the target audience refers to scientists & advanced users looking for data to perform or reproduce an analysis.

They are/should be aware of the RUCIO as a service, but enjoying the UI and features of a tool as JupyterLab.

And because this is a tool intrinsically web-based, it can be used in a cloud computing environment. So, in terms of setup, it points also to the institute SysAdmins that set those tools for their academic community.

RUCIO & JupyterLab

The JupyterLab RUCIO plugin

In 2020 at CERN, Muhammad Aditya Hilmy created a JupyterLab extension that allows the proper authentication (login/pass or certificate) and access to the datasets in the Data Lake using RUCIO.

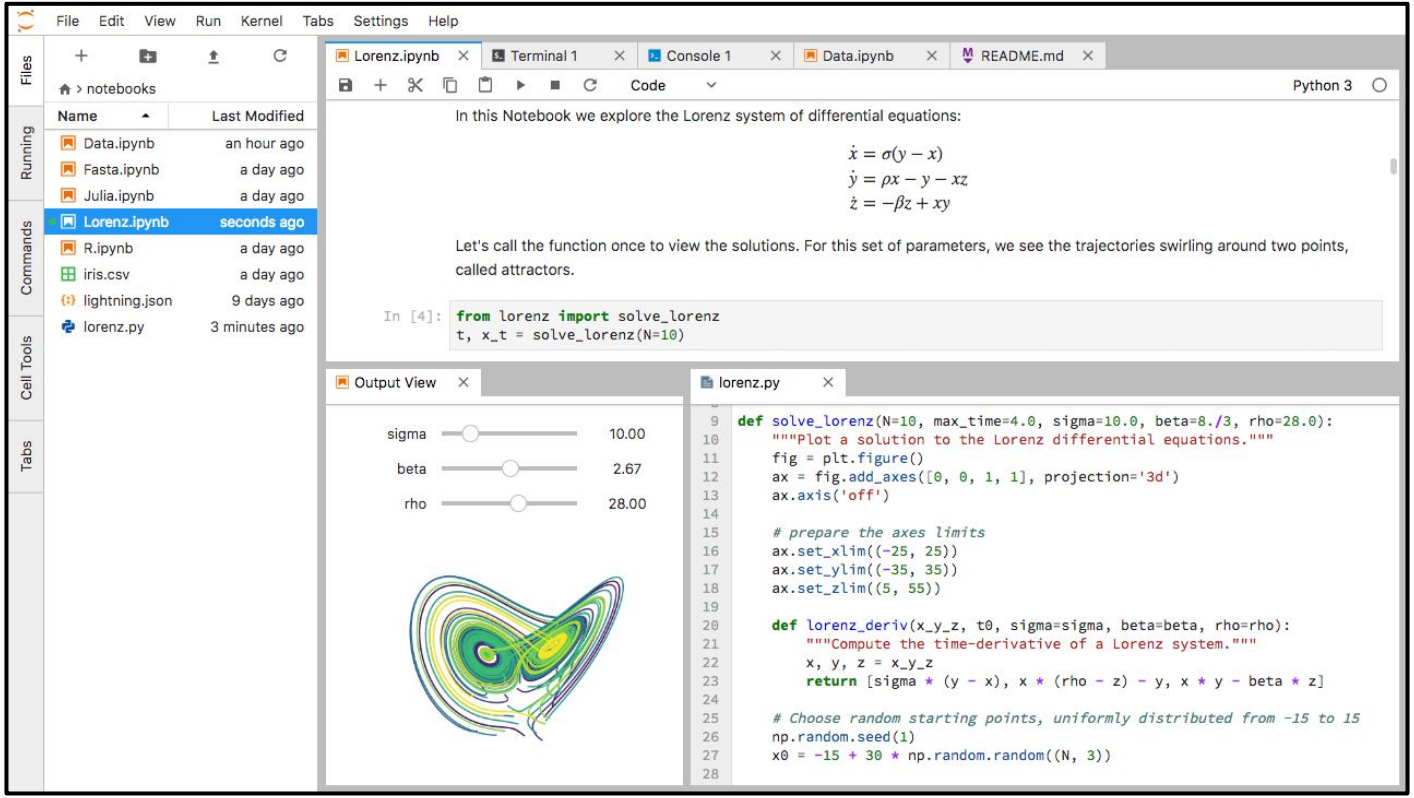
More on how it looks like in one of Muhammad's presentations

The main idea is to deliver an easy and transparent way to access, download and use datasets replicated in the Data Lake.
It hides all the complexity on that access and allows a seamless usage of the data in a Jupyter notebook analysis.

The traditional JupyterLab UI

A well-known tool for all of us (data analysis and visualisation) is the Jupyter notebook.

JupyterLab is a suite of tools and features that allow interacting with multiple elements in a single view. And do the computation, of course.



Name	Last Modified
Data.ipynb	an hour ago
Fasta.ipynb	a day ago
Julia.ipynb	a day ago
Lorenz.ipynb	seconds ago
R.ipynb	a day ago
iris.csv	a day ago
lightning.json	9 days ago
lorenz.py	3 minutes ago

In this Notebook we explore the Lorenz system of differential equations:

$$\dot{x} = \sigma(y - x)$$
$$\dot{y} = \rho x - y - xz$$
$$\dot{z} = -\beta z + xy$$

Let's call the function once to view the solutions. For this set of parameters, we see the trajectories swirling around two points, called attractors.

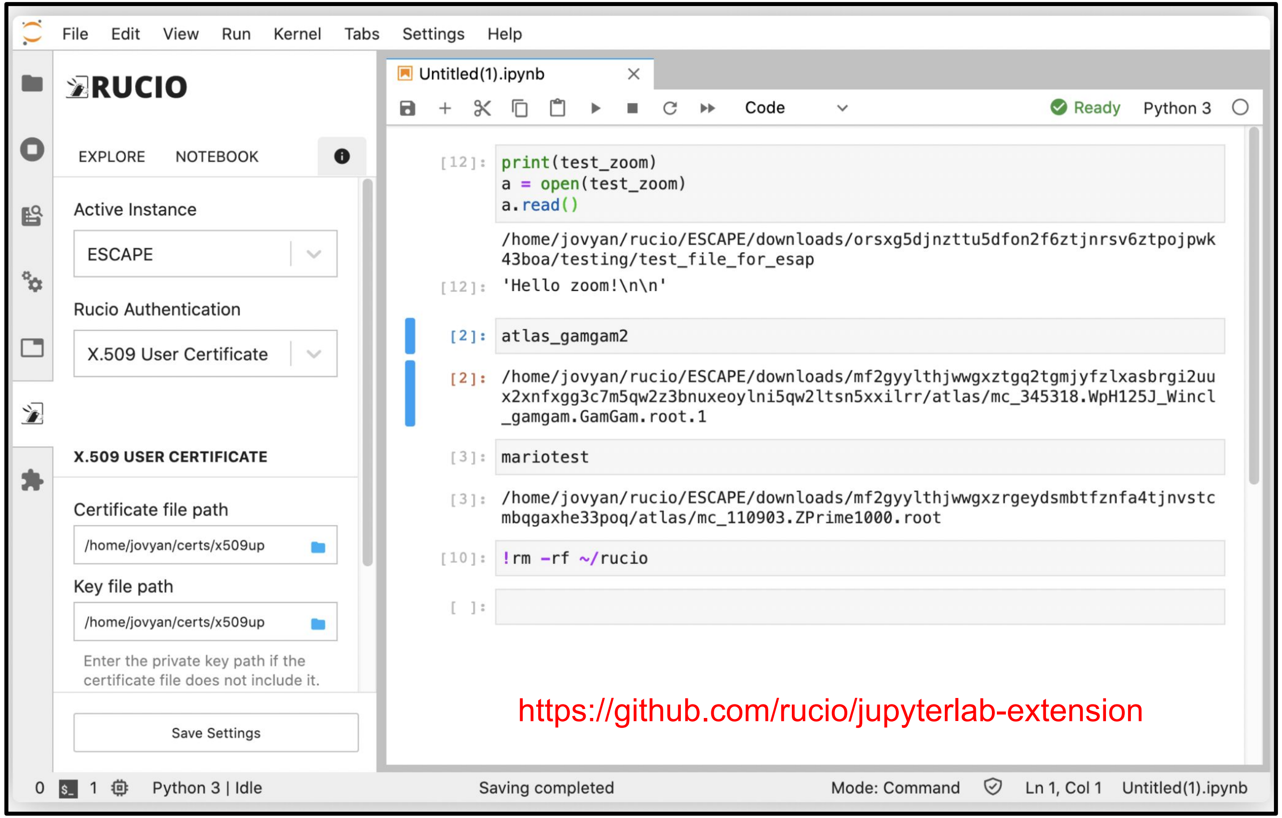
In [4]:
```
from lorenz import solve_lorenz
t, x_t = solve_lorenz(N=10)
```

```
def solve_lorenz(N=10, max_time=4.0, sigma=10.0, beta=8./3, rho=28.0):
    """Plot a solution to the Lorenz differential equations."""
    fig = plt.figure()
    ax = fig.add_axes([0, 0, 1, 1], projection='3d')
    ax.axis('off')

    # prepare the axes limits
    ax.set_xlim((-25, 25))
    ax.set_ylim((-35, 35))
    ax.set_zlim((5, 55))

    def lorenz_deriv(x_y_z, t0, sigma=sigma, beta=beta, rho=rho):
        """Compute the time-derivative of a Lorenz system."""
        x, y, z = x_y_z
        return [sigma * (y - x), x * (rho - z) - y, x * y - beta * z]

    # Choose random starting points, uniformly distributed from -15 to 15
    np.random.seed(1)
    x0 = -15 + 30 * np.random.random((N, 3))

```

The RUCIO extension for JupyterLab

The JupyterLab RUCIO extension allows to authenticate and interact with the datasets from the web UI.

Making much easier the exploration and analysis of samples in the Data Lake infrastructure.



Active Instance: ESCAPE

Rucio Authentication: X.509 User Certificate

X.509 USER CERTIFICATE

Certificate file path: /home/jovyan/certs/x509up

Key file path: /home/jovyan/certs/x509up

Enter the private key path if the certificate file does not include it.

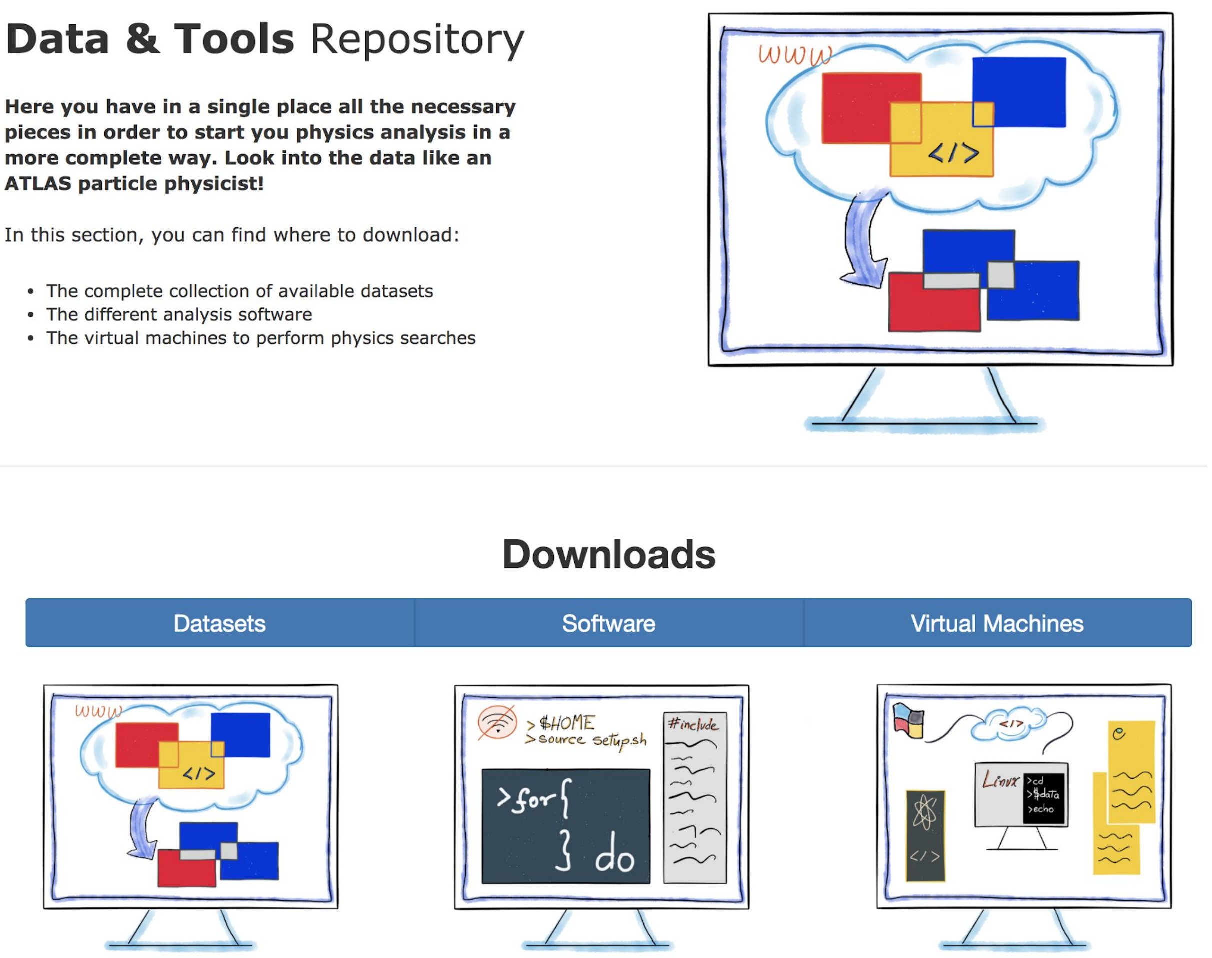
```
[12]: print(test_zoom)
      a = open(test_zoom)
      a.read()

      /home/jovyan/rucio/ESCAPE/downloads/orsxg5djnzttu5dfon2f6ztjnrsv6ztpojpwk
      43boa/testing/test_file_for_esap
[12]: 'Hello zoom!\n\n'

 [2]: atlas_gamgam2

 [2]: /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjwwgxztgq2tgmjyfzlxasbrgi2uu
      x2xnfxgg3c7m5qw2z3bnuxeoylni5qw2ltsn5xxilrr/atlas/mc_345318.WpH125J_Wincl
      _gamgam.GamGam.root.1

 [3]: mariotest

 [3]: /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjwwgxzrgeydsmbtfznfa4tjnvstc
      mbqgaxhe33poq/atlas/mc_110903.ZPrime1000.root

[10]: !rm -rf ~/rucio

[ ]:
```

https://github.com/rucio/jupyterlab-extension

ATLAS
Open Data

We deploy the resources on the Internet.
In a nutshell, they are a series of

- Data samples in ROOT n-tuple format
- Software and Jupyter Notebooks in Python and C++ to analyse the samples and produce physics analysis
- JavaScript (JS) applications to produce cut-and-count analysis
- Virtual Machines with several Linux-based OS and ROOT CERN analysis framework
- GitHub & GitLab repositories
- GitBooks to document the several possible activities that can be performed



Data & Tools Repository

Here you have in a single place all the necessary pieces in order to start you physics analysis in a more complete way. Look into the data like an ATLAS particle physicist!

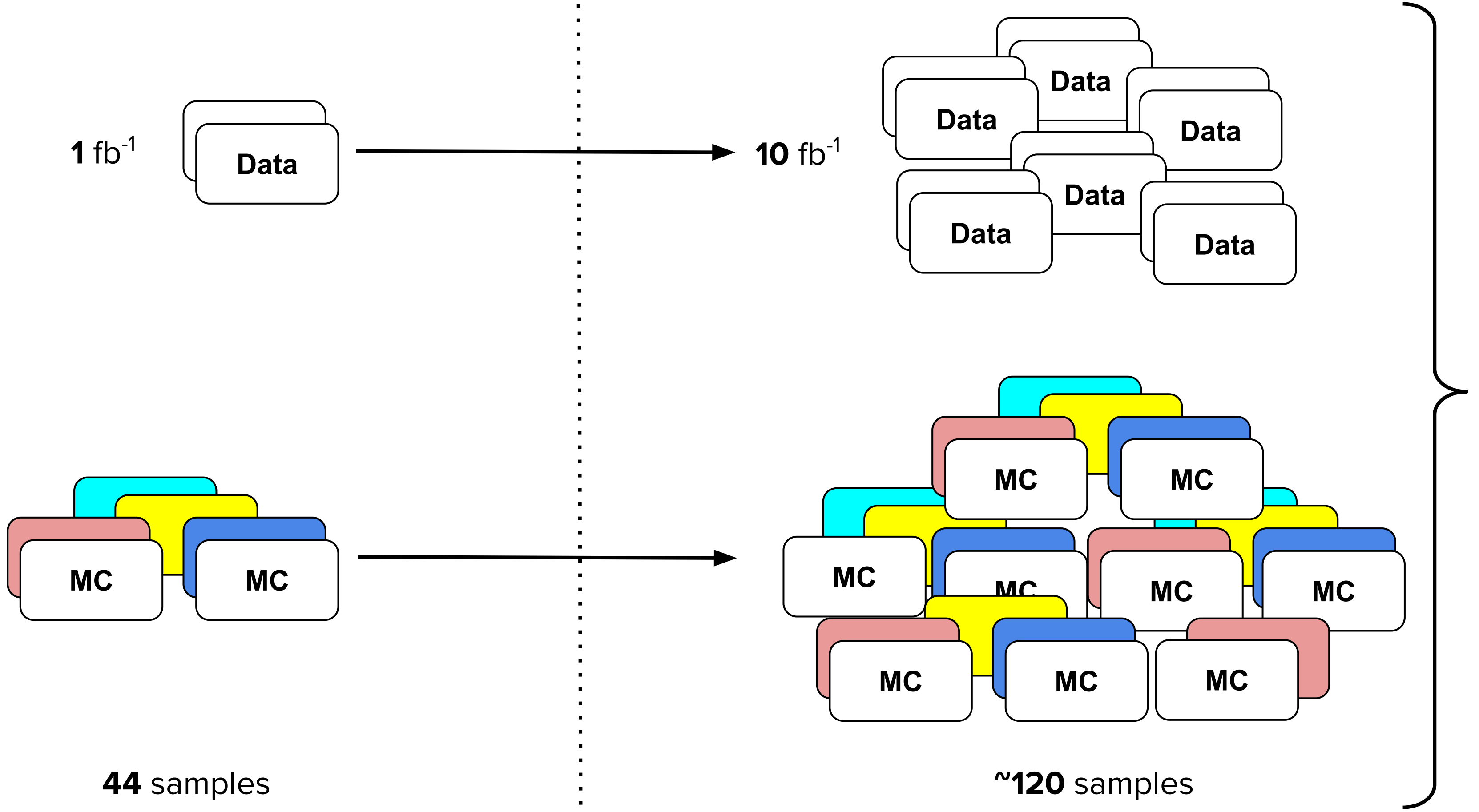
In this section, you can find where to download:

- The complete collection of available datasets
- The different analysis software
- The virtual machines to perform physics searches

Downloads

8 TeV release

13 TeV release



1 fb^{-1}

Data

10 fb^{-1}

Data

Data

Data

Data

Data

Data

MC

MC

MC

MC

MC

MC

MC

MC

MC

MC

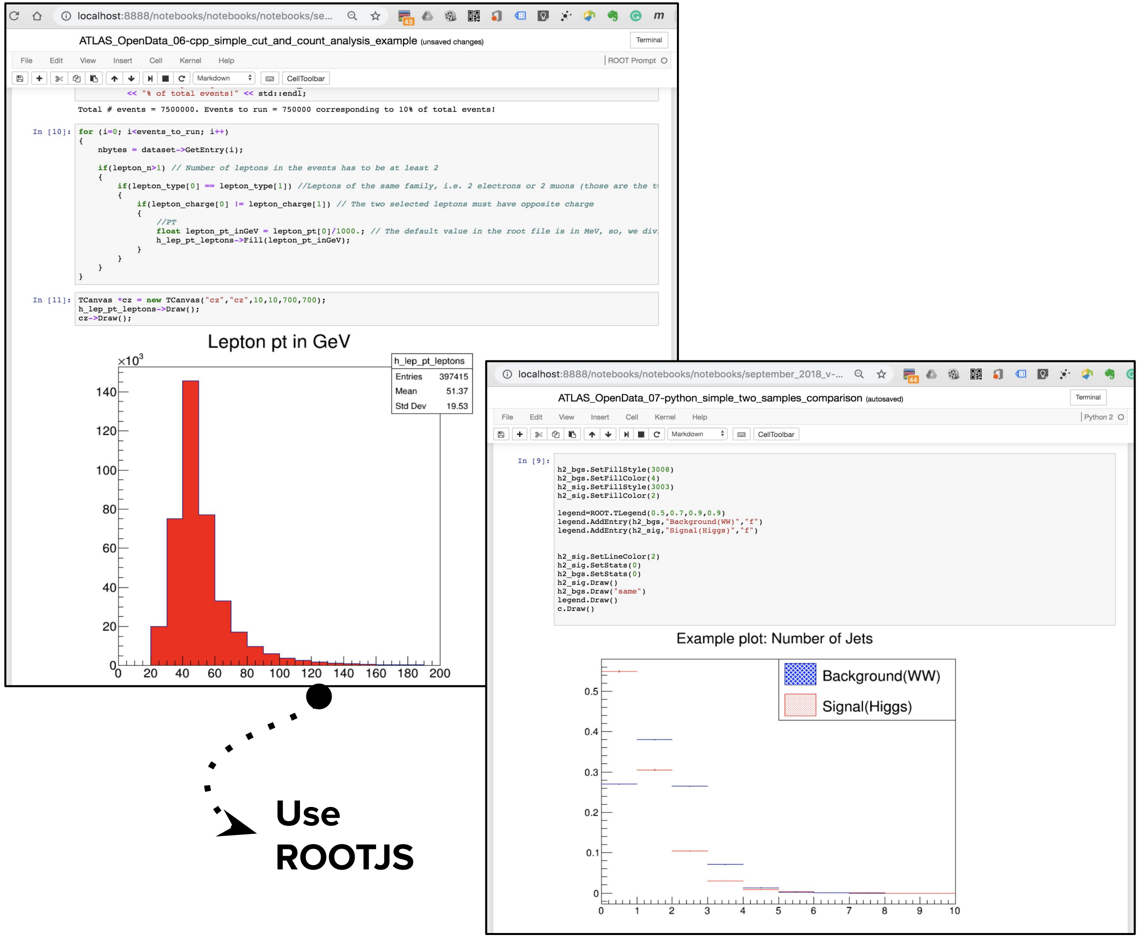
MC

44 samples

~**120** samples

≥ **7**

Collections based in final states



ATLAS_OpenData_06-cpp_simple_cut_and_count_analysis_example (unsaved changes)

```
         << "% of total events!" << std::endl;
```

```
Total # events = 7500000. Events to run = 750000 corresponding to 10% of total events!
```

```
In [10]: for (i=0; i<events_to_run; i++)
         {
             nbytes = dataset->GetEntry(i);

             if(lepton_n>1) // Number of leptons in the events has to be at least 2
             {
                 if(lepton_type[0] == lepton_type[1]) //Leptons of the same family, i.e. 2 electrons or 2 muons (those are the t
                 {
                     if(lepton_charge[0] != lepton_charge[1]) // The two selected leptons must have opposite charge
                     {
                         //PT
                         float lepton_pt_inGeV = lepton_pt[0]/1000.; // The default value in the root file is in MeV, so, we div
                         h_lep_pt_leptons->Fill(lepton_pt_inGeV);
                     }
                 }
             }
         }
```

```
In [11]: TCanvas *cz = new TCanvas("cz","cz",10,10,700,700);
         h_lep_pt_leptons->Draw();
         cz->Draw();
```

h_lep_pt_leptons	
Entries	397415
Mean	51.37
Std Dev	19.53

ATLAS_OpenData_07-python_simple_two_samples_comparison (autosaved)

```
In [9]:
        h2_bgs.SetFillStyle(3008)
        h2_bgs.SetFillColor(4)
        h2_sig.SetFillStyle(3003)
        h2_sig.SetFillColor(2)

        legend=ROOT.TLegend(0.5,0.7,0.9,0.9)
        legend.AddEntry(h2_bgs,"Background(WW)","f")
        legend.AddEntry(h2_sig,"Signal(Higgs)","f")


        h2_sig.SetLineColor(2)
        h2_sig.SetStats(0)
        h2_bgs.SetStats(0)
        h2_sig.Draw()
        h2_bgs.Draw("same")
        legend.Draw()
        c.Draw()
```

Use ROOTJS

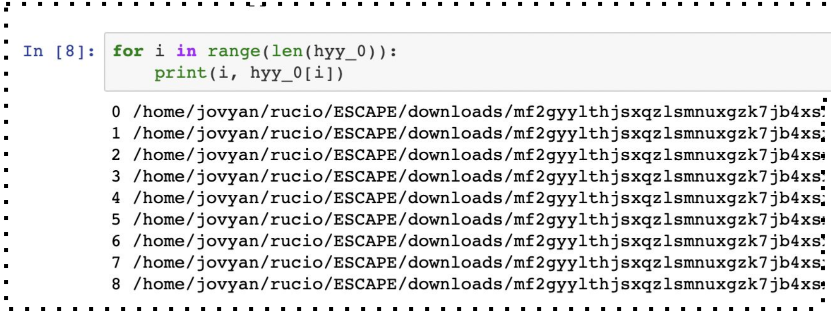
Jupyter notebooks can run ROOT commands

- We produce a series of examples for basic training on the usage of the notebooks, reading of the samples and plotting simple analysis.
- The notebooks use both the Python and the C++ ROOT kernel to produce results that can be adjusted by teachers and trainers.
- The notebooks can read the samples directly from the Internet (using http protocol) or run local (if there is limited Internet access)

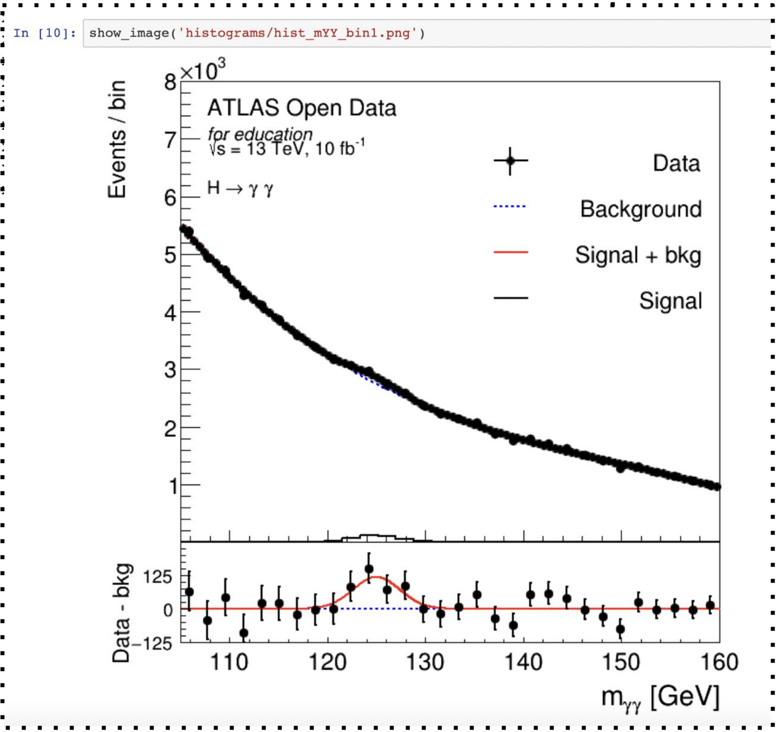
The pieces together:

ATLAS Jupyter Notebooks and JupyterLab RUCIO extension

The ATLAS Open Data as a test field



```
In [8]: for i in range(len(hyy_0)):
            print(i, hyy_0[i])

        0 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
        1 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
        2 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
        3 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
        4 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
        5 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
        6 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
        7 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
        8 /home/jovyan/rucio/ESCAPE/downloads/mf2gyylthjsxqzlsmnuxgzk7jb4xs
```

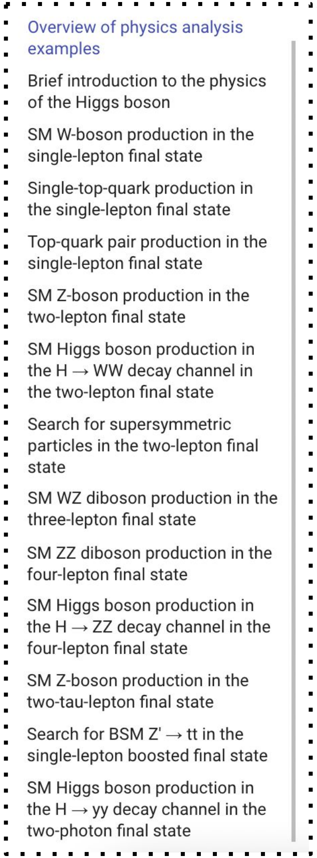


```
In [10]: show_image('histograms/hist_mYY_bin1.png')
```

Once the Open Data datasets are registered in RUCIO (*like is the case for the current 13 TeV samples, like those in this Higgs into two photons example, thanks to Stephane)* they can be downloaded and read, using the JupyterLab extension, including search features

Example in nbviewer.jupyter.org

The ATLAS Open Data as a test field



Overview of physics analysis examples

Brief introduction to the physics of the Higgs boson

SM W-boson production in the single-lepton final state

Single-top-quark production in the single-lepton final state

Top-quark pair production in the single-lepton final state

SM Z-boson production in the two-lepton final state

SM Higgs boson production in the H → WW decay channel in the two-lepton final state

Search for supersymmetric particles in the two-lepton final state

SM WZ diboson production in the three-lepton final state

SM ZZ diboson production in the four-lepton final state

SM Higgs boson production in the H → ZZ decay channel in the four-lepton final state

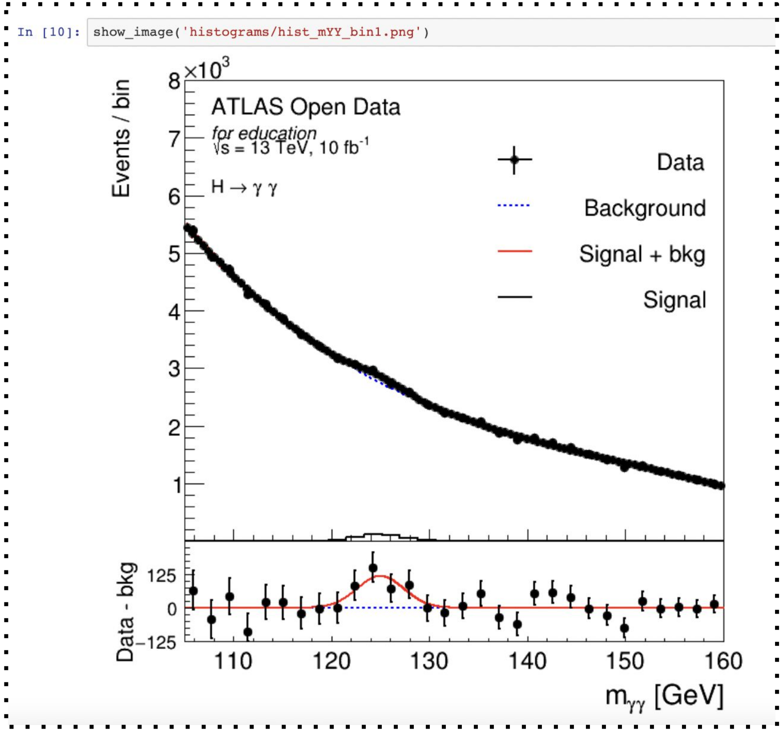
SM Z-boson production in the two-tau-lepton final state

Search for BSM Z' → tt in the single-lepton boosted final state

SM Higgs boson production in the H → yy decay channel in the two-photon final state

Much more computational complex particle physics analysis already exist and they will be used/converted and improved when needed so to be a proper set of analysis examples as close as possible to “real” analysis, using the existing publicly available data

More in Opendata.atlas.cern - documentation 13 TeV - physics.

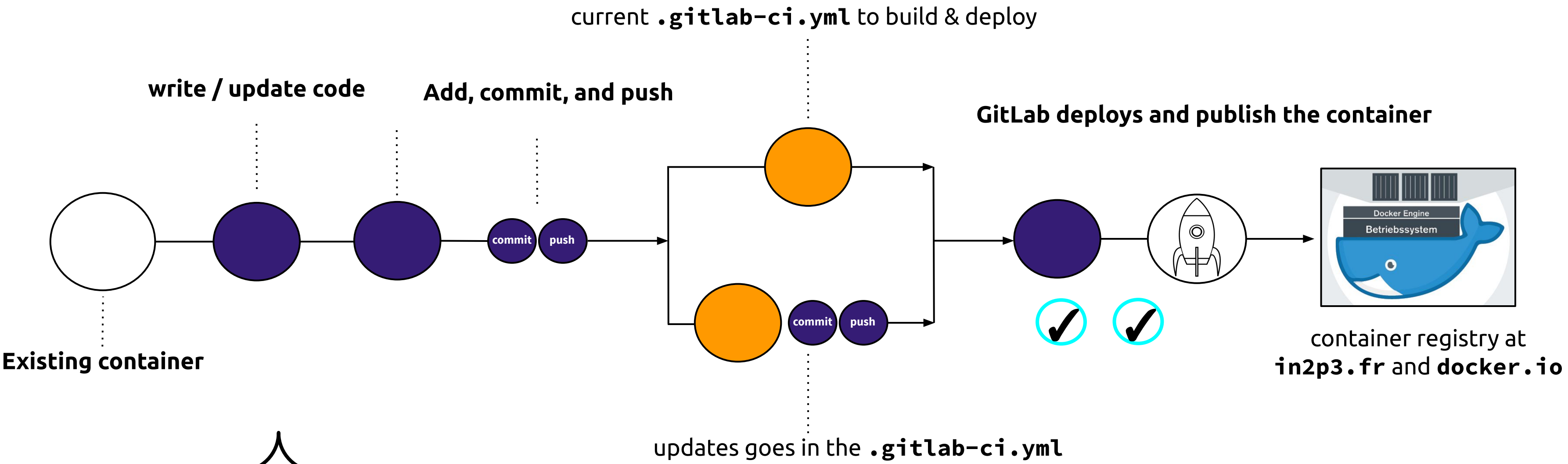


```
In [10]: show_image('histograms/hist_mYY_bin1.png')
```

Work at LAPP

- What I understood until now :) any missing info or mistake is mine

A very first view to the current container


current **.gitlab-ci.yml** to build & deploy
write / update code
Add, commit, and push
GitLab deploys and publish the container
commit
push
commit
push
Docker Engine
Betriebssystem
✓
✓
Existing container
container registry at
in2p3.fr and **docker.io**
updates goes in the **.gitlab-ci.yml**

Container CI / CD

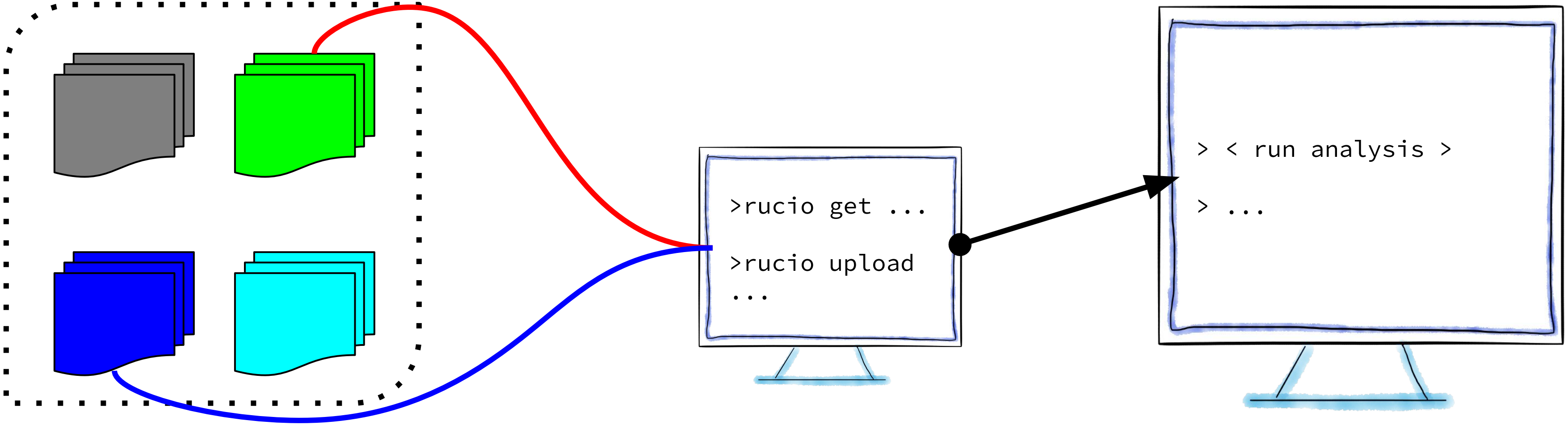
- The series of resources is package in a single container
- The CI setup automatically handles the publication of the container

Frédéric & Berkay's job

Several developments and deployment already in place

- The compendium of resources includes the current rucio client + JupyterLab + RUCIO extension, proxy & authentication, ...

Recap

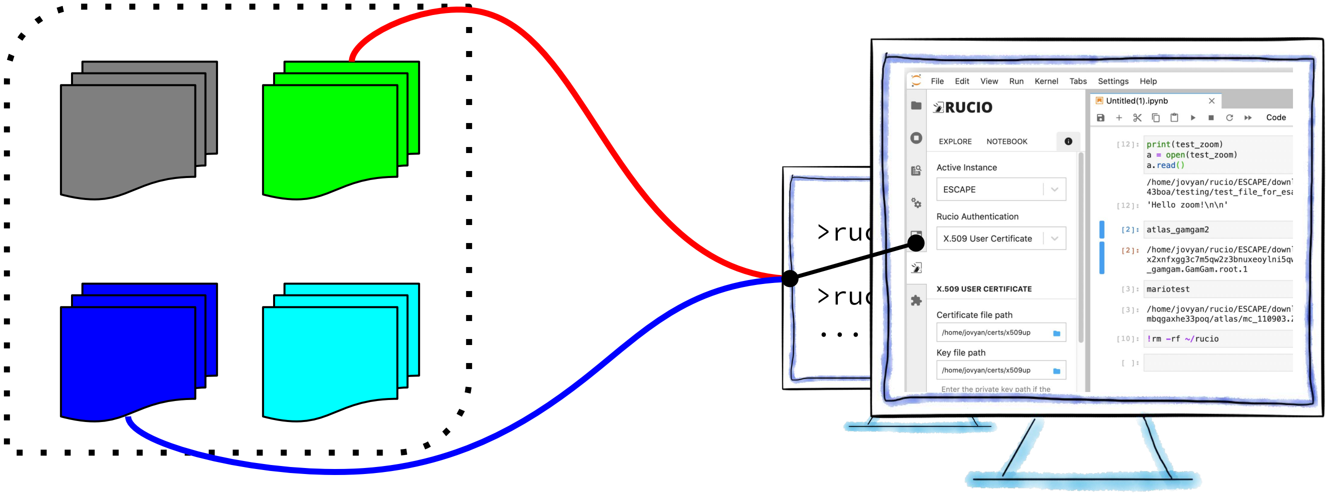


```
>rucio get ...

>rucio upload
...
```

```
> < run analysis >

> ...
```

RUCIO CLI
Data Lake and some stored datasets
Analysis execution on-premises

Traditional interaction with samples



Active Instance: ESCAPE

Rucio Authentication: X.509 User Certificate

X.509 USER CERTIFICATE

Certificate file path: /home/jovyan/certs/x509up

Key file path: /home/jovyan/certs/x509up

Enter the private key path if the

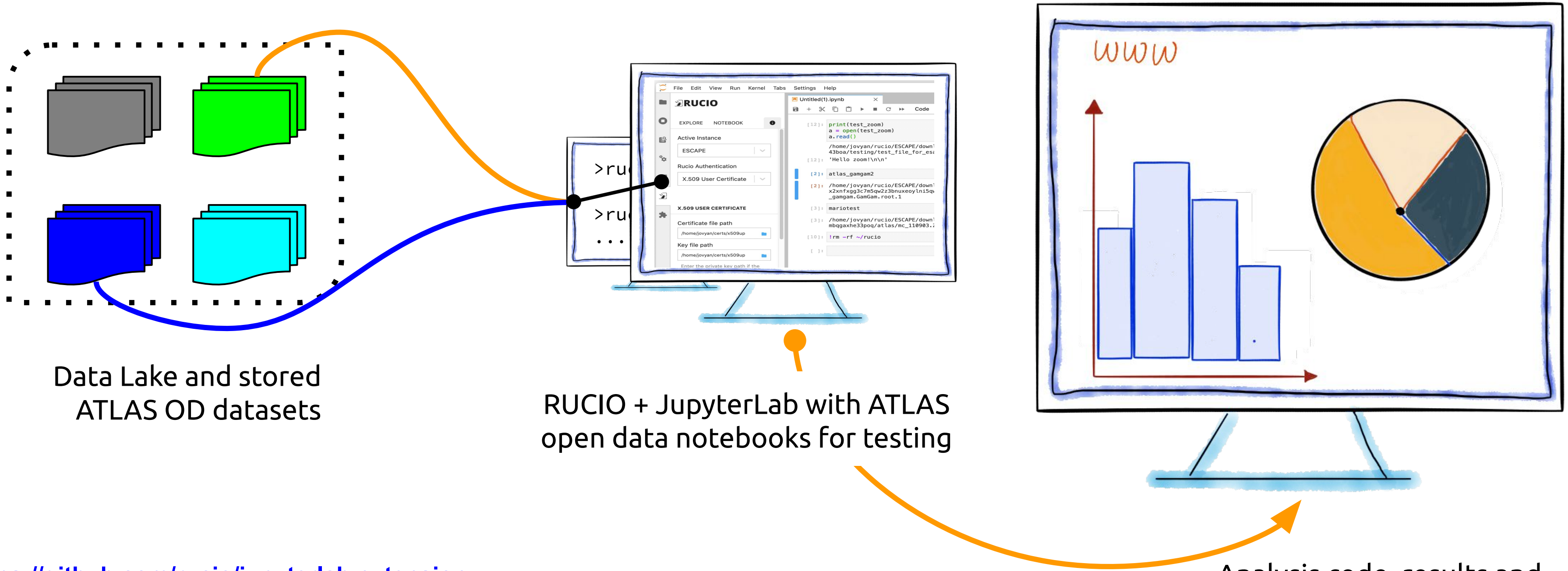
```
[12]: print(test_zoom)
      a = open(test_zoom)
      a.read()
      /home/jovyan/rucio/ESCAPE/downl
      43boa/testing/test_file_for_esa
[12]: 'Hello zoom!\n\n'

[2]:  atlas_gamgam2
[2]:  /home/jovyan/rucio/ESCAPE/downl
      x2xnfxgg3c7m5qw2z3bnuxeoylni5qw
      _gamgam.GamGam.root.1

[3]:  mariotest
[3]:  /home/jovyan/rucio/ESCAPE/downl
      mbqgaxhe33poq/atlas/mc_110903.2

[10]: !rm -rf ~/rucio

[ ]:
```

Authentication, discovery and download of the samples using the Web UI

Data Lake and stored Open Data datasets

Container with RUCIO + JupyterLab extension

RUCIO+JupyterLab (container) proposal for end users



Active Instance: ESCAPE

Rucio Authentication: X.509 User Certificate

X.509 USER CERTIFICATE

Certificate file path: /home/jovyan/certs/x509up

Key file path: /home/jovyan/certs/x509up

Enter the private key path if the

```
[12]: print(test_zoom)
      a = open(test_zoom)
      a.read()
      /home/jovyan/rucio/ESCAPE/downl
      43boa/testing/test_file_for_esa
[12]: 'Hello zoom!\n\n'

[2]: atlas_gamgam2
[2]: /home/jovyan/rucio/ESCAPE/downl
     x2xnfxgg3c7m5qw2z3bnuxeoylni5qw
     _gamgam.GamGam.root.1

[3]: mariotest
[3]: /home/jovyan/rucio/ESCAPE/downl
     mbqgaxhe33poq/atlas/mc_110903.2

[10]: !rm -rf ~/rucio

[ ]:
```

Data Lake and stored
ATLAS OD datasets

RUCIO + JupyterLab with ATLAS
open data notebooks for testing

Analysis code, results and
visualisation

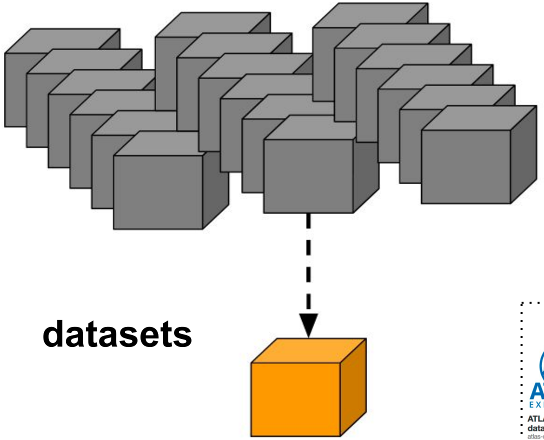
https://github.com/rucio/jupyterlab-extension
https://github.com/atlas-outreach-data-tools/notebooks-collection-opendata

A view of the service

Summary

The job now is the testing, consolidation and use of the mentioned resources in a consistent way that resembles a single service + analysis of real experimental data.

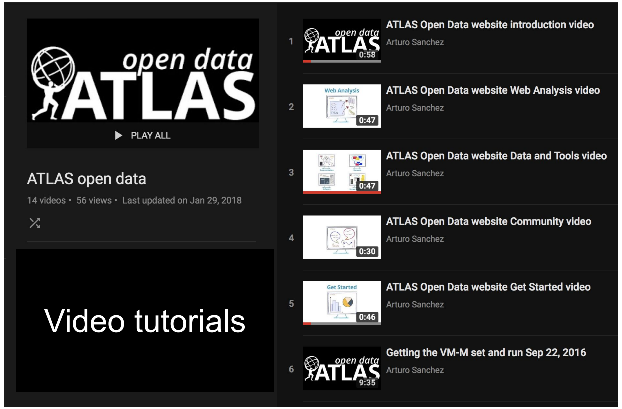
Backup



The ATLAS Open Data project aims to release real and simulated Data, together with Open Source software resources to analyse those samples.

As well as documentation in several useful formats!

Software Book
ATLAS EXPERIMENT
ATLAS Outreach data and tools
atlas-outreach-data-tools
GitBook
Setup your enviroment
ATLAS EXPERIMENT
ATLAS Outreach data and tools
atlas-outreach-data-tools



ATLAS open data

14 videos • 56 views • Last updated on Jan 29, 2018

Video tutorials

1. ATLAS Open Data website introduction video — Arturo Sanchez — 0:58
2. ATLAS Open Data website Web Analysis video — Arturo Sanchez — 0:47
3. ATLAS Open Data website Data and Tools video — Arturo Sanchez — 0:47
4. ATLAS Open Data website Community video — Arturo Sanchez — 0:30
5. ATLAS Open Data website Get Started video — Arturo Sanchez — 0:46
6. Getting the VM-M set and run Sep 22, 2016 — Arturo Sanchez — 9:35

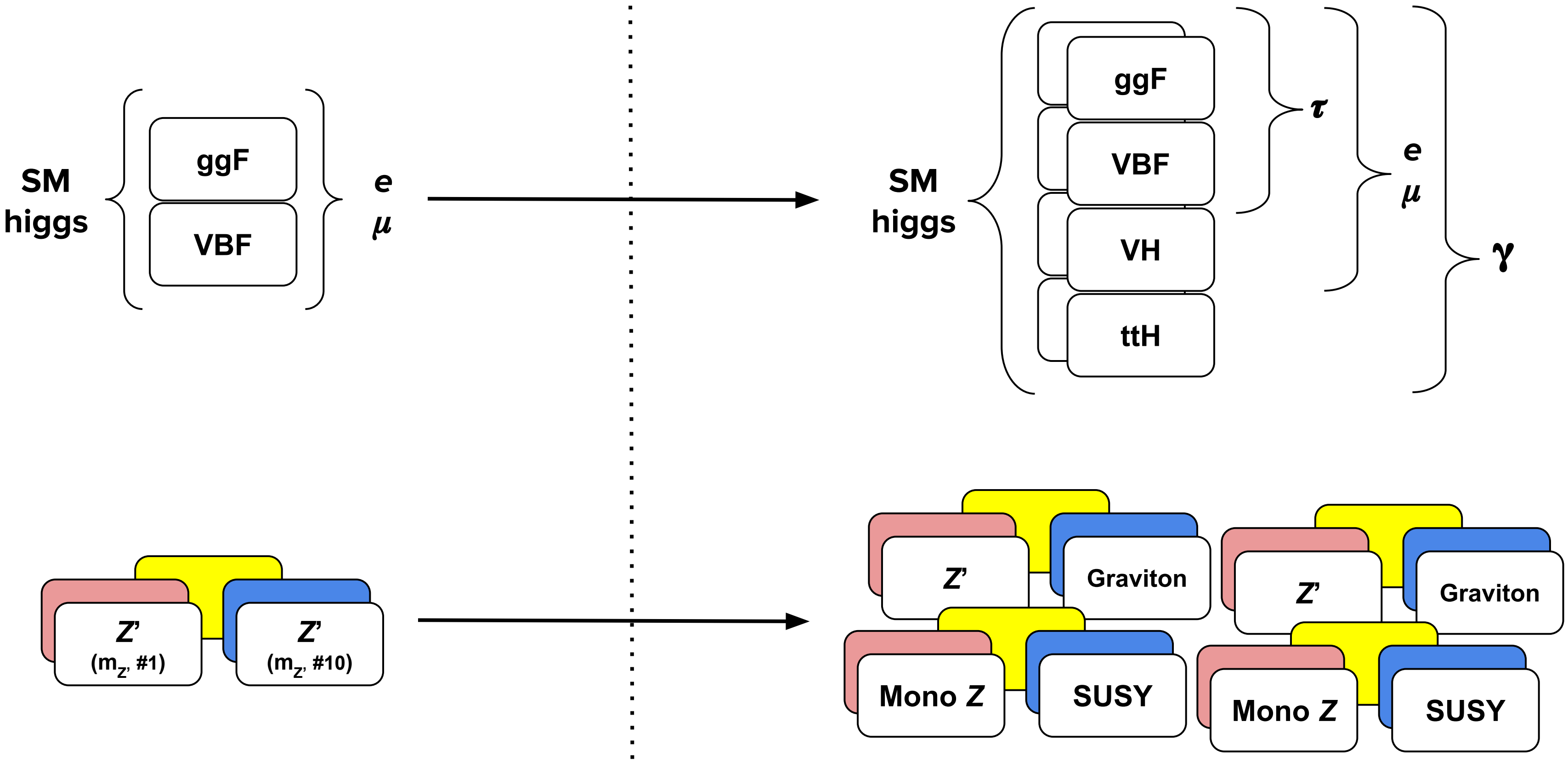
ATLAS Open Data

An Educational project in High Energy Physics

http://opendata.atlas.cern/

8 TeV MC signals

13 TeV MC signals



14 BSM samples

≥ **50 BSM** samples