ATLAS-D Meeting 2013 - Würzburg

ATLANTIS

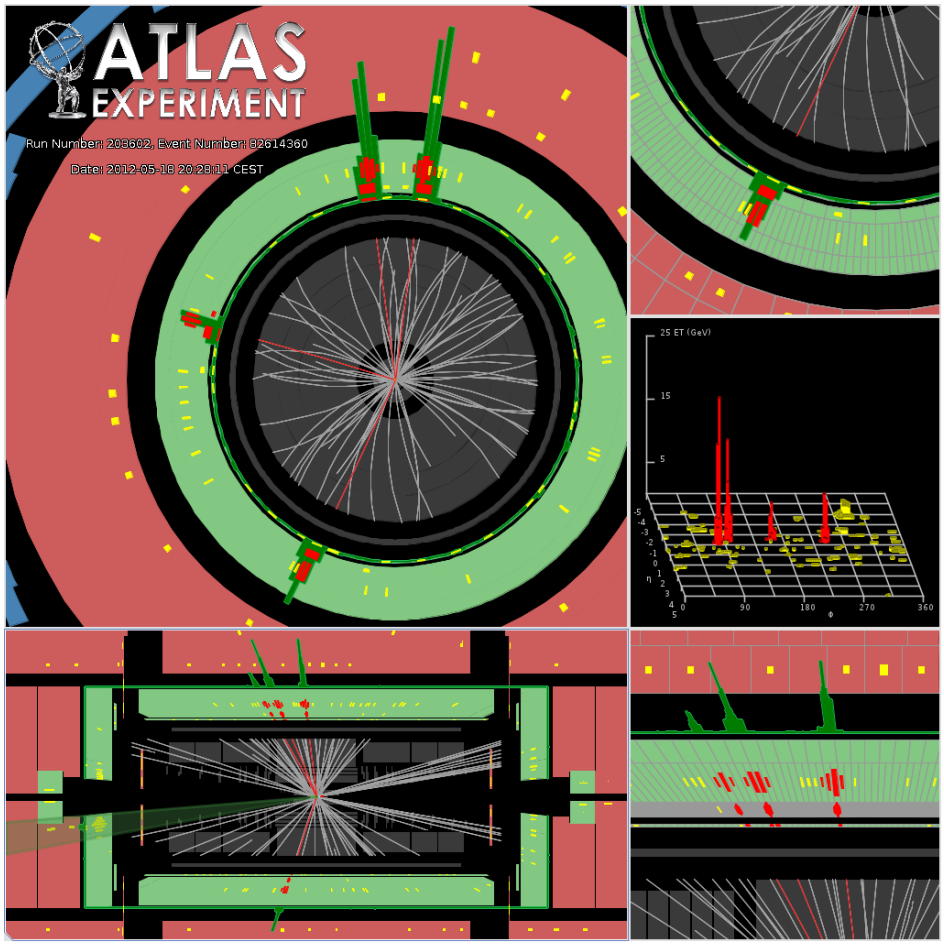
M. Böhler

September 24th 2013

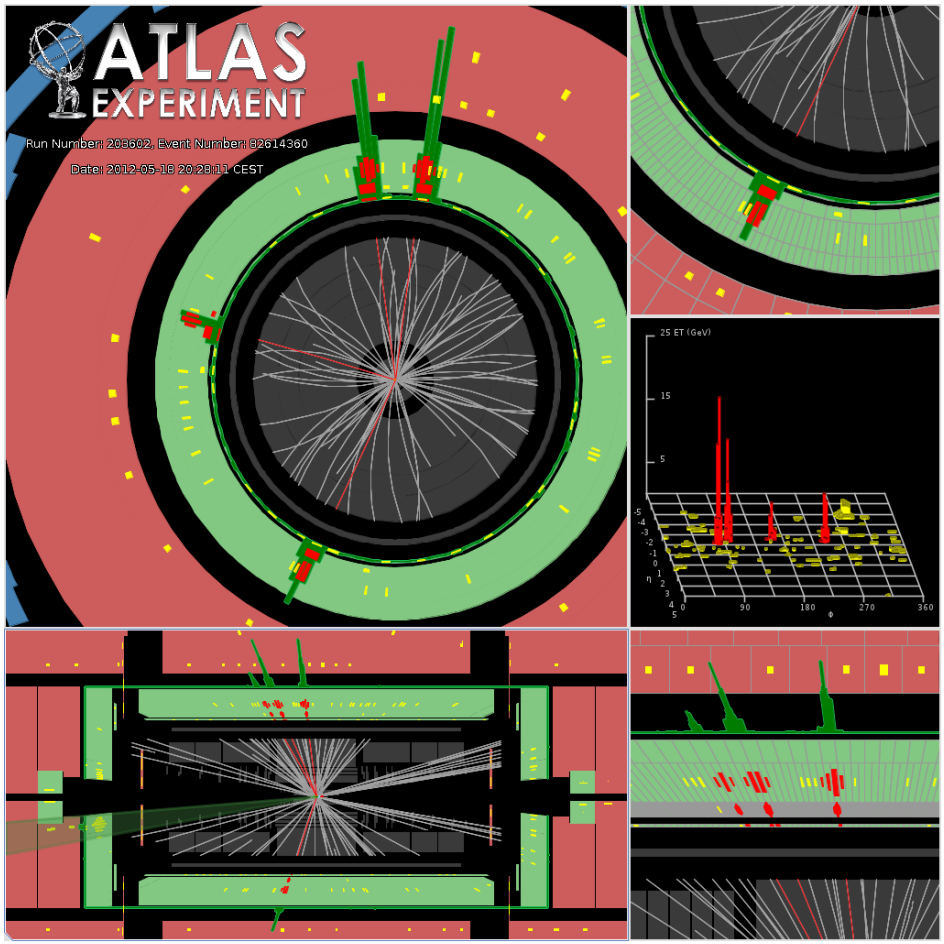
Albert-Ludwigs-Universität Freiburg

UNI FREIBURG

Outline



Outline



What is ATLANTIS?

- Atlantis provides a graphical representation of an event
- aims to display complete ATLAS events in an intuitive way
- to make fast and correct conclusions about the underlying physics processes

- Within ATLAS it is used for:
  - Monitoring data taking in the control room
  - Analysis of individual events (debugging)
  - Creating images for publications

- Outside ATLAS it is used for:
  - Outreach
  - Master classes

Structure of ATLANTIS

- The Atlantis application consists of two programs/packages:
  1. The event file generator, JiveXML, running inside Athena
  2. The event viewer, Atlantis, which runs locally

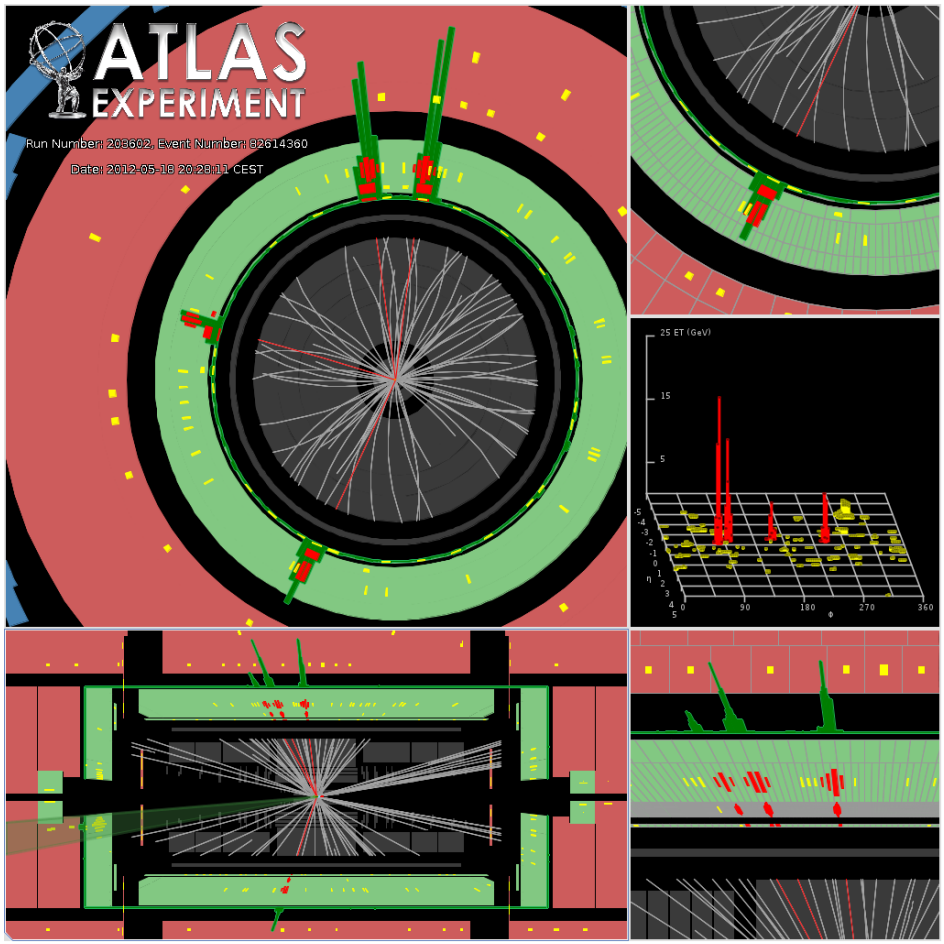
Structure of ATLANTIS

- The Atlantis application consists of two programs/packages:
  1. The event file generator, JiveXML, running inside Athena
  2. The event viewer, Atlantis, which runs locally

1. JiveXML packages can convert RAW/ESD/AOD events into single-event XML files. These XML files can be read by the viewer.
   - Athena jobs produce one XML file per event
     this can be done by:
     - JiveXML_jobOptions_PhysicsRAW.py
     - JiveXML_jobOptions_PhysicsAOD.py
     - ....

       → According to the detail level of the input files (RAW,AOD), the event display is more or less detailed
   - Instructions on JiveXML can be found on the TWiki:
     https://twiki.cern.ch/twiki/bin/view/AtlasComputing/Atlantis
2. The event viewer is presented in the second part of this session

Outline



JiveXML Package - Hands-on (local default setup)

more detail in:
CERN Tutorial TWiki

Setup ATHENA (this time the following Version):

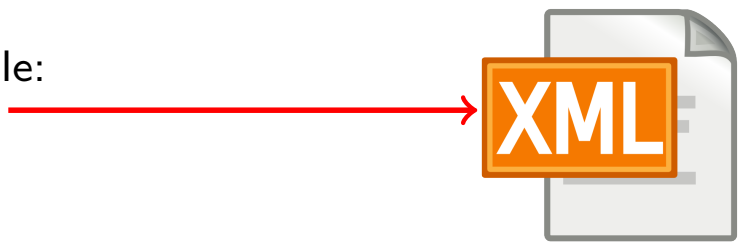
```
mkdir eventPickingTest
cd eventPickingTest
asetup 17.2.3.5,here,slc5
```

Retrieve JiveXML_jobOptions files:

```
get_files -jo JiveXML_jobOptions_PhysicsAOD.py
```

Run ATHENA with the a JiveXML jobOption file:

```
athena JiveXML_jobOptions_PhysicsAOD.py
```



JiveXML Package - Hands-on (local default setup)

more detail in:
CERN Tutorial TWiki

Setup ATHENA (this time the following Version):

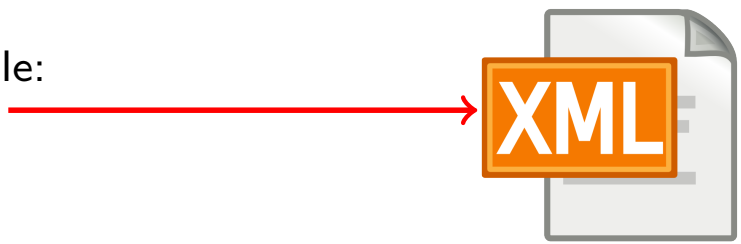
```
mkdir eventPickingTest
cd eventPickingTest
asetup 17.2.3.5,here,slc5
```

Retrieve JiveXML_jobOptions files:

```
get_files -jo JiveXML_jobOptions_PhysicsAOD.py
```

Run ATHENA with the a JiveXML jobOption file:

```
athena JiveXML_jobOptions_PhysicsAOD.py
```



Then copy the newly produced xml files to your desy web directory:

```
mkdir -p ~/www/EventPicking/AOD
fs setacl -dir ~/www -acl desy-hosts read      (<-- this has to be done only once)
cp JiveXML_*.xml ~/www/EventPicking/AOD
```

Later on you can examine your events via the url:

```
http://www.desy.de/~<user name>/EventPicking/AOD/JiveXML_*.xml
```

Event Picking - with pAthena

create text file (here *rrr.txt*) with run *space* event numbers; e.g:

```
215414 33764295
215414 33763743
215414 33765718
```

more detail in:
CERN Tutorial TWiki

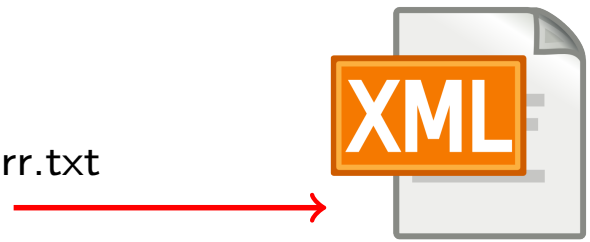
for this example, we will use pAthena:
Setup the pAthena environment (in a new shell)

```
cd eventPickingTest
asetup 17.2.3.5,here,slc5
localSetupPandaClient
```

Retrieve the job option file:

```
athena JiveXML_jobOptions_PhysicsRAW.py
```

Submit command to find the events from the text file rrr.txt




```
pathena JiveXML_jobOptions_PhysicsRAW.py  --eventPickEvtList rrr.txt \
--eventPickDataType RAW --outDS user.<nickname>.AtlantisRAW_test \
--extOutFile "JiveXML*.xml" --eventPickStreamName physics_Muons  \
--supStream=GLOBAL,ESD
```

Event Picking - with pAthena

create text file (here *rrr.txt*) with run *space* event numbers; e.g:

more detail in:
CERN Tutorial TWiki

```
215414 33764295
215414 33763743
215414 33765718
```

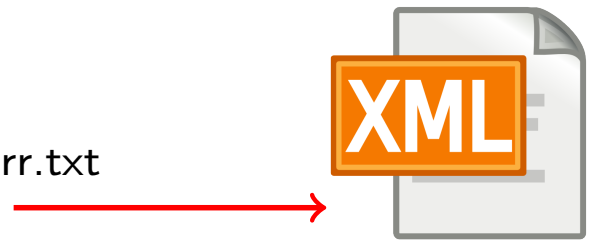
for this example, we will use pAthena:
Setup the pAthena environment (in a new shell)

```
cd eventPickingTest
asetup 17.2.3.5,here,slc5
localSetupPandaClient
```

Retrieve the job option file:

```
athena JiveXML_jobOptions_PhysicsRAW.py
```

Submit command to find the events from the text file rrr.txt




```
pathena JiveXML_jobOptions_PhysicsRAW.py  --eventPickEvtList rrr.txt \
--eventPickDataType RAW --outDS user.<nickname>.AtlantisRAW_test \
--extOutFile "JiveXML*.xml" --eventPickStreamName physics_Muons  \
--supStream=GLOBAL,ESD
```

- What if my events are only on tape?
  - ..you will receive a message and email, informing you that the files will attempt to be staged to disk and you can then **retry sometime later**
  - if you see this message, submit the job as shown below, with the additional –eventPickStagedDS argument

```
pathena JiveXML_jobOptions_PhysicsRAW.py  --eventPickEvtList rrr.txt \
  --eventPickDataType RAW --outDS user.<nickname>.AtlantisRAW_test \
  --extOutFile "JiveXML*.xml" --eventPickStreamName physics_Muons \
  --eventPickStagedDS  user.<nickname>.tutorial.eventPick --supStream=GLOBAL,ESD
```

Event Picking - with Ganga

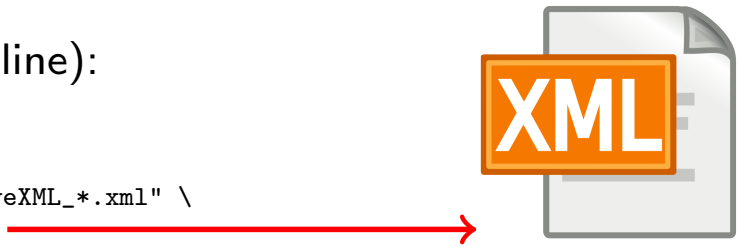
Running the same job within Ganga, you need to setup Ganga instead (please use another shell):

```
cd eventPickingTest
asetup 17.2.3.5,here,slc5
localSetupGanga
```

more detail in:
CERN Tutorial TWiki

And then submit the jobs (either via command line):

```
ganga athena --pickevent --pick_event_list rrr.txt \
      --pick_data_type RAW --pick_stream_name physics_Muons \
      --pick_dataset_pattern '*physics_Muons*' --extOutFile "JiveXML_*.xml" \
      JiveXML_jobOptions_PhysicsRAW.py
```



Event Picking - with Ganga

Running the same job within Ganga, you need to setup Ganga instead (please use another shell):

more detail in:
CERN Tutorial TWiki

```
cd eventPickingTest
asetup 17.2.3.5,here,slc5
localSetupGanga
```

And then submit the jobs (either via command line):

```
ganga athena --pickevent --pick_event_list rrr.txt \
      --pick_data_type RAW --pick_stream_name physics_Muons \
      --pick_dataset_pattern '*physics_Muons*' --extOutFile "JiveXML_*.xml" \
      JiveXML_jobOptions_PhysicsRAW.py
```

or through the IPython interface:

```
j = Job()
j.application=Athena()
j.application.option_file=['JiveXML_jobOptions_PhysicsRAW.py' ]
j.application.prepare()

j.inputdata=EventPicking()
j.inputdata.pick_data_type = 'RAW'
j.inputdata.pick_stream_name = "physics_Muons"
j.inputdata.pick_dataset_pattern = "*physics_Muons"
j.inputdata.pick_event_list = 'rrr.txt'

j.outputdata=DQ2OutputDataset()

j.splitter=DQ2JobSplitter()
j.splitter.numsubjobs = 10

j.backend=Panda()
j.backend.extOutFile = ['JiveXML_*.xml']

j.submit()
```

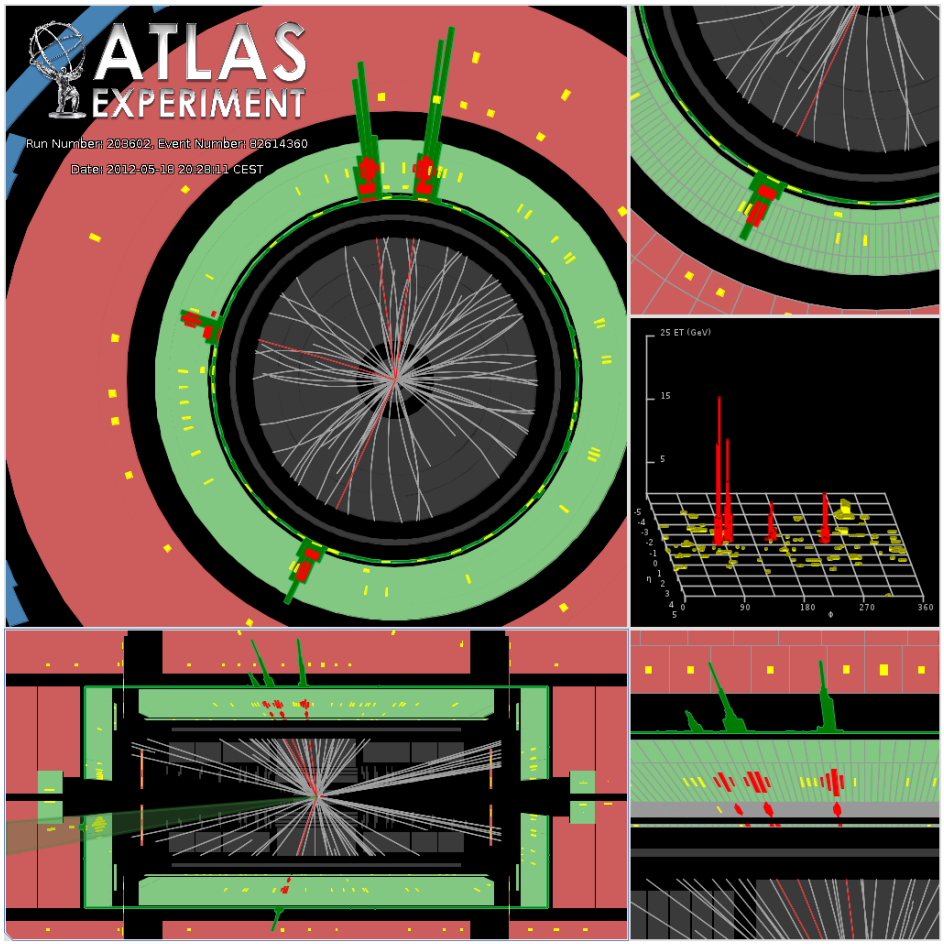
JiveXML Package - Hands-on run on your own data

- Create file containing the run number and the event number of your final events:
  - this you can do by scanning your output ntuple:

```
root -l filtered.d3pd.root
root [1] MySkimmedD3PD->Scan("RunNumber:EventNumber")
************************************
*    Row   * RunNumber * EventNumb *
************************************
*        0 *    189090 *    416755 *
*        1 *    189090 *    480342 *
*        2 *    189090 *    502881 *
*        3 *    189090 *    502806 *
*        4 *    189090 *    492178 *
*        5 *    189090 *    523277 *
....
```

- Write the run number and the event number into a *events.txt* file
- Submit either via pAthena or Ganga the EventPicking script (as described on previous pages) to the Grid
- RAW data is mainly stored on tape, this might take some days
  - so we have to skip that - it should give you an idea, how to produce your own event displays in a non tutorial environment

Outline



Getting ATLANTIS up and running

- Atlantis can be started in several ways
  - Directly from the Athena environment by typing atlantis (not recommended unless you have Athena installed locally)
  - From http://cern.ch/atlantis/download
    - Starting it directly using Java WebStart
    - Downloading it as a tgz archive
- We are using the tutorial version today
  - loads automatically the right events

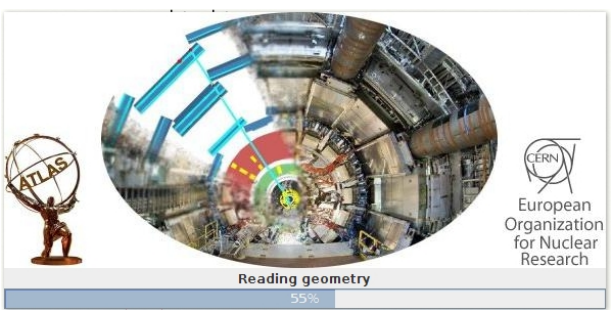
1. Download: AtlantisJava-09-16-04-05-tutorial.tgz
2. Extract ATLANTIS

```
tar xfv AtlantisJava-09-16-04-05-tutorial.tgz
```

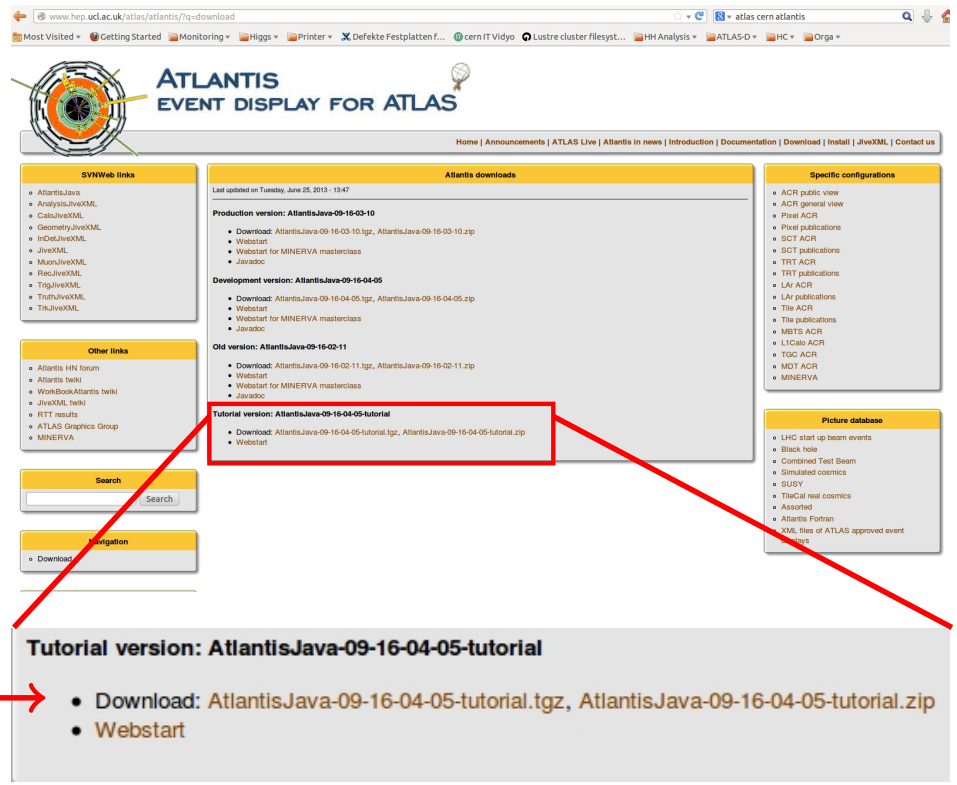
3. Start the java app with:

```
java -Dapple.awt.graphics.UseQuartz=false -jar atlantis.jar
```

- You should see the start screen.....

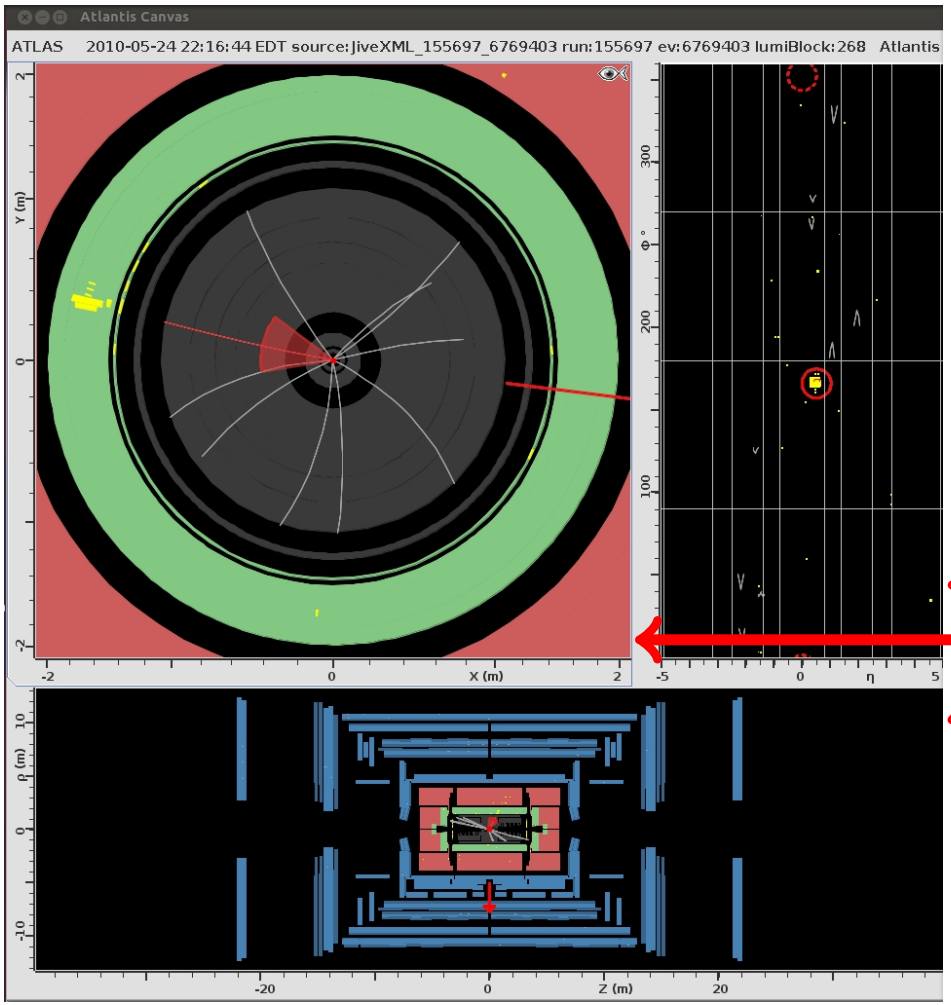


http://www.hep.ucl.ac.uk/atlas/atlantis/



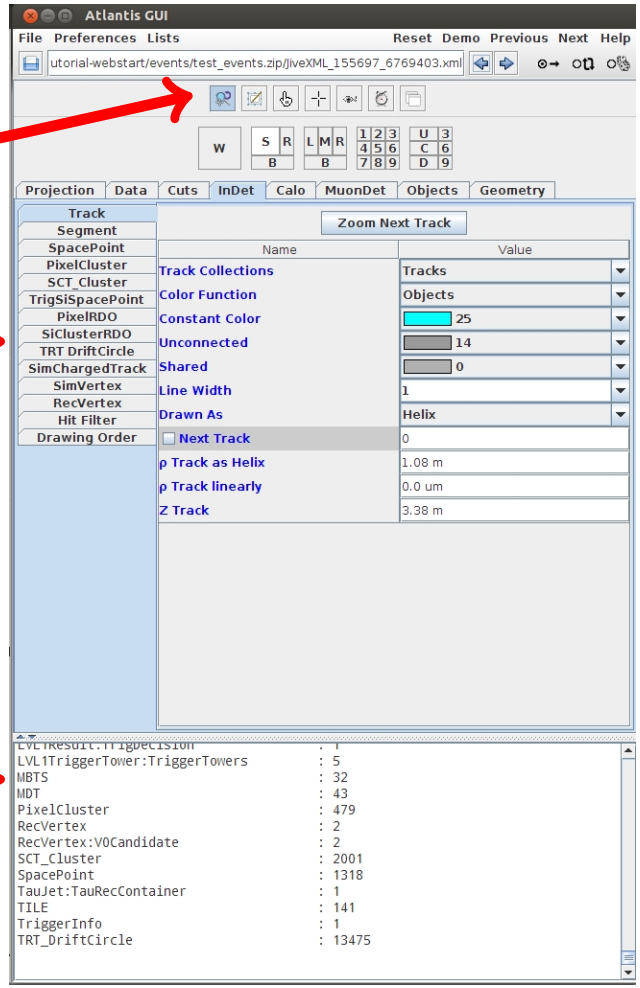
User interface basics

- Canvas



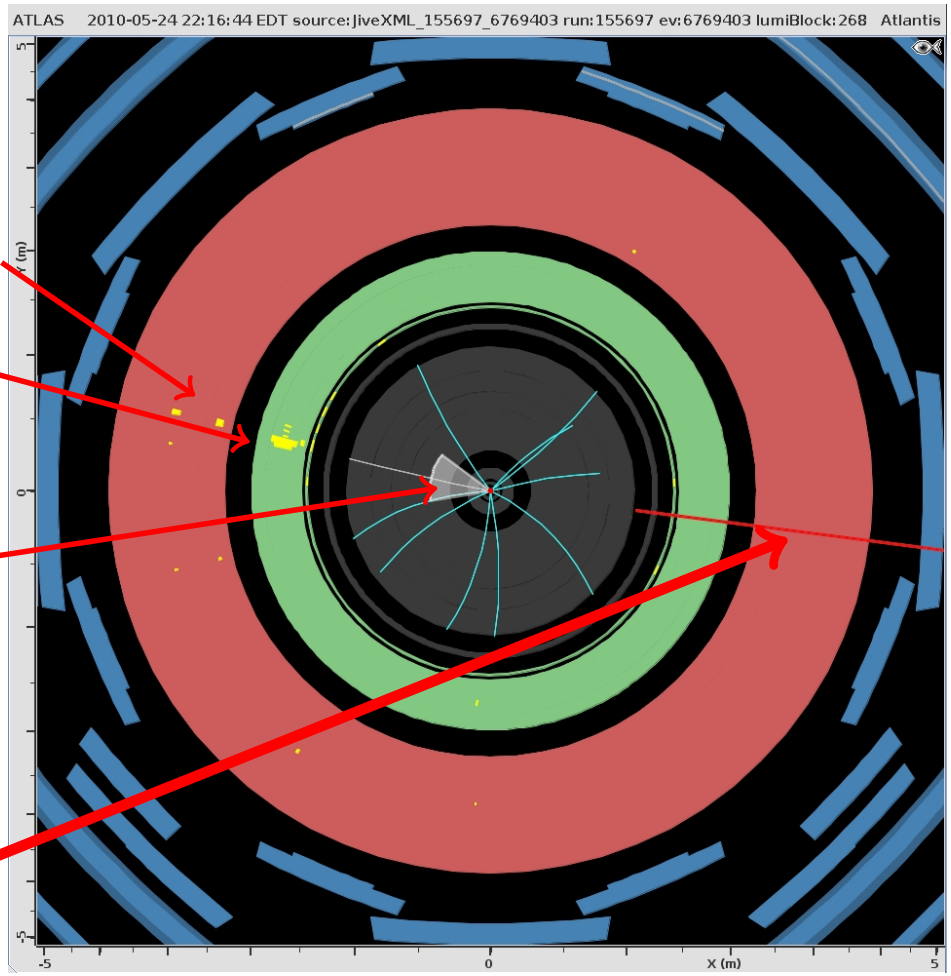
- interaction tools
- tabs contain setting and cuts
- projections in $\phi\eta$, yx, ρz
- information window

- GUI



Looking at your first event

- Calorimeter energy deposits (hadronic, electromagnetic)
- Jet with only 1 track
- Direction of MET



xy projection, transverse view

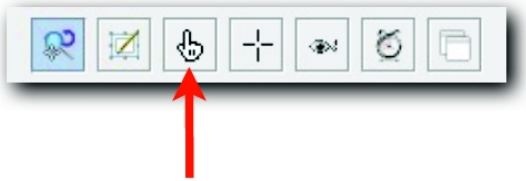
Interaction Tools:

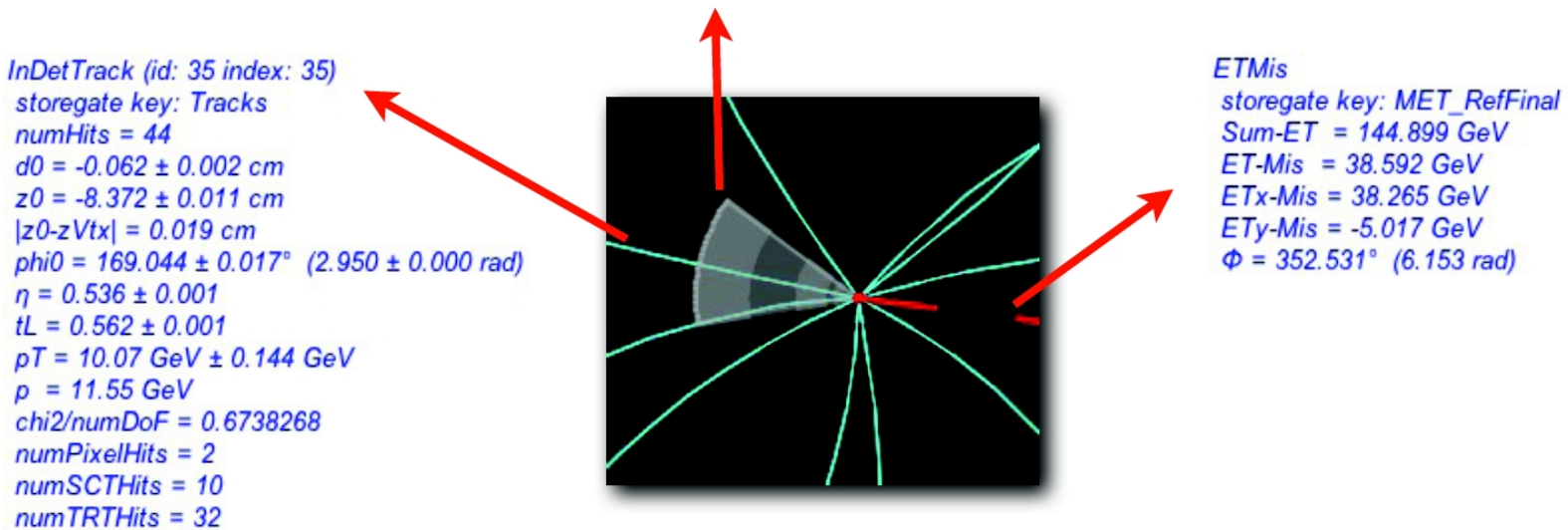
The zoom tool: lets you zoom in on the interaction point. The point you click stays under the mouse, drag it in or out to zoom.

The rubberband tool: lets you select an area on the canvas, you can then select to zoom in on this area.

Looking at your first event

- Now select the pick tool and look at the details of some of the objects we see

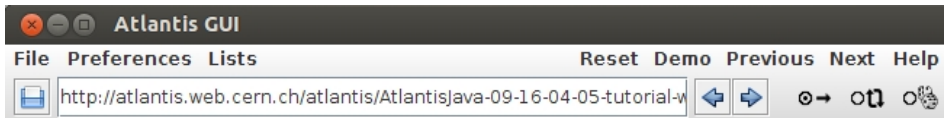


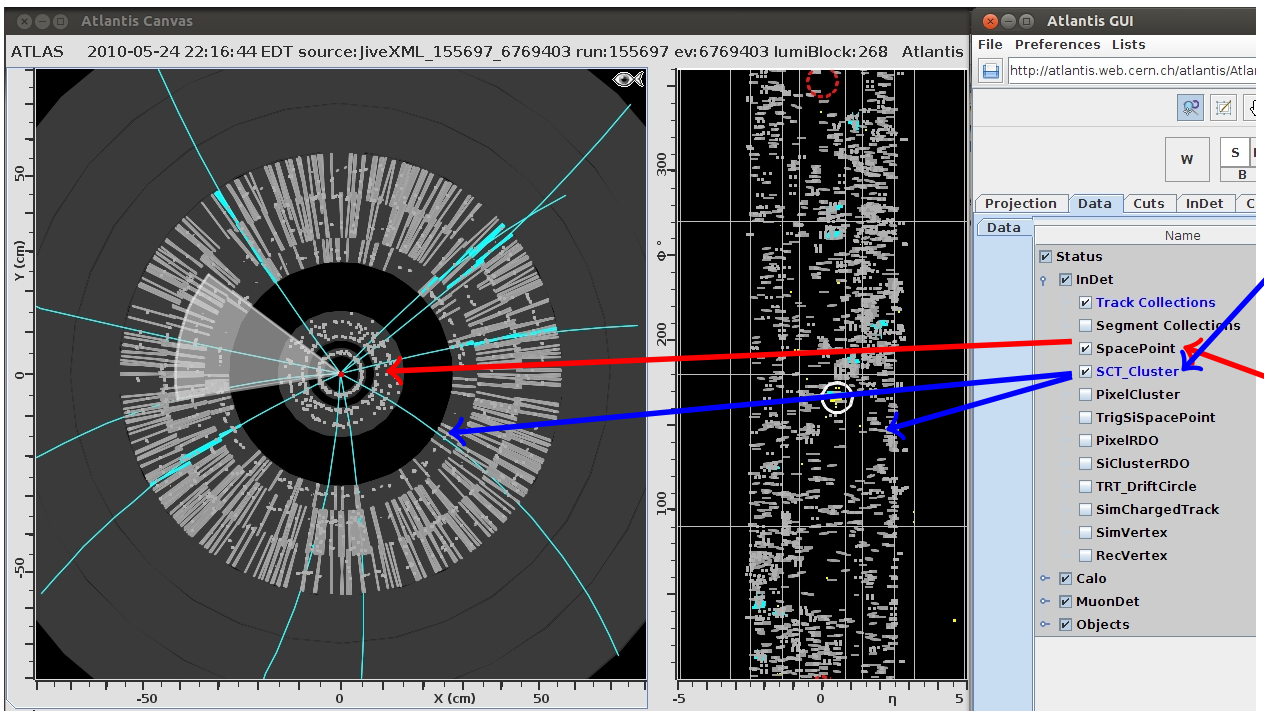


- We have a 36 GeV jet balancing the missing ET, containing one track of only 10 GeV.
  - What can this be?

Displaying/hiding datatypes

- you can undo all changes by **Reset**
- go to the next event in this folder by **Next**



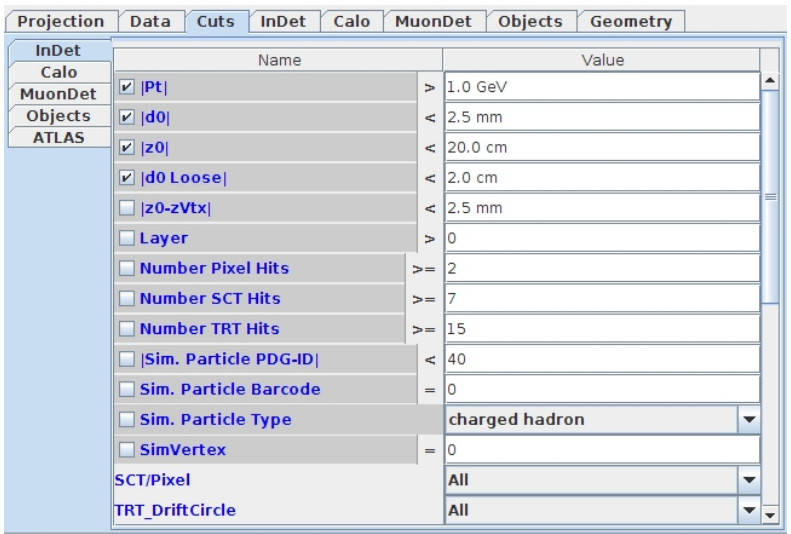


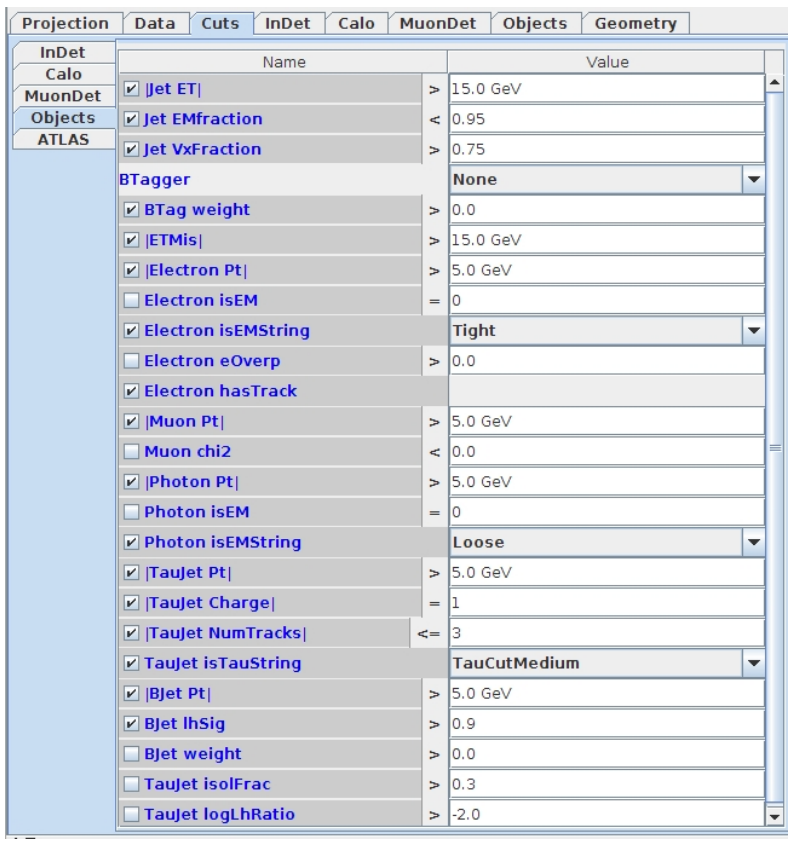
Settings and cuts differenciate between **Global** and **Local**

- **Global** settings (blue in setting window) apply to all windows
- **Local** settings (black in setting window) only to the selected window
- Right click on any setting to switch local/global

Applying cuts

- all cuts on this slide are applied **globally** → to all windows
- cuts can be applied on detector subsystems as well as on physics objects



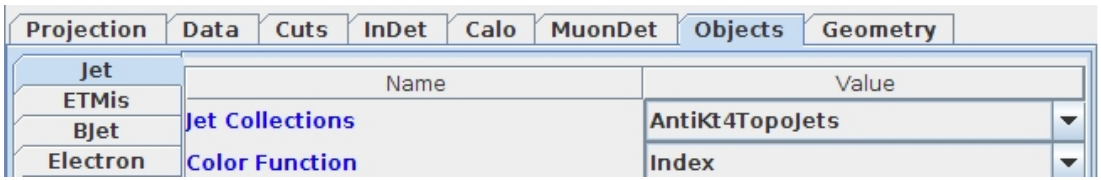


- Try raising the track pT cut from 1 to 5 GeV

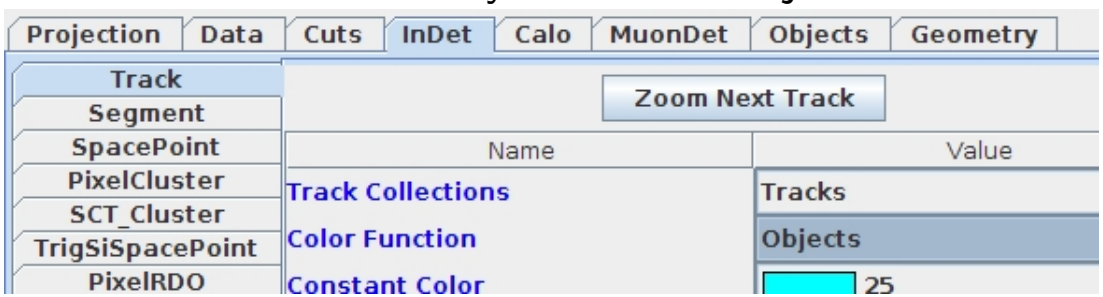
Associations

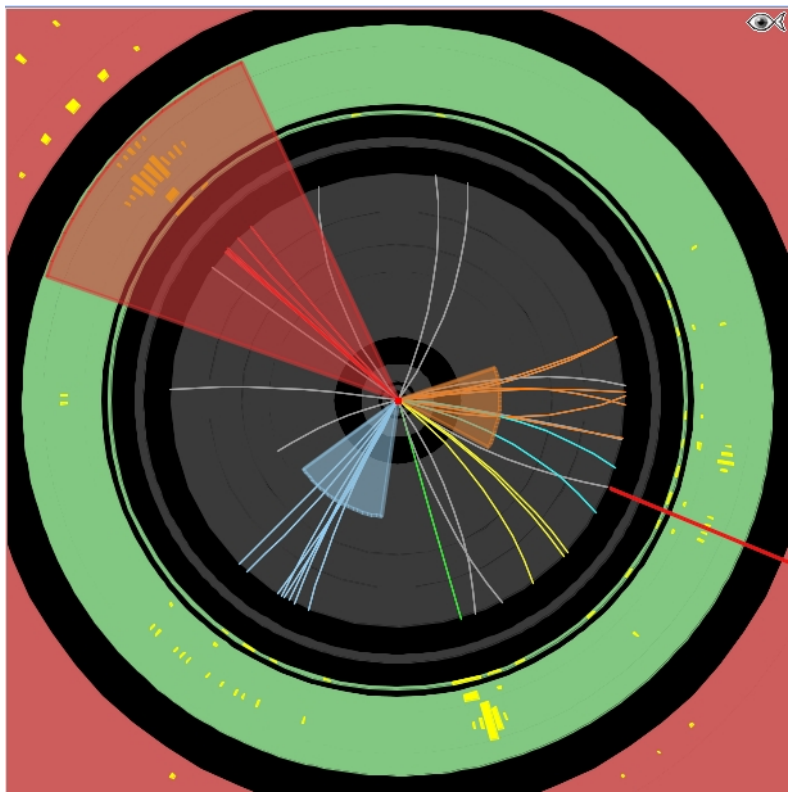
- Atlantis also knows about associations between objects, for example the tracks that are associated to a jet

Give each jet a different color (color by index)...



...then color the tracks by associated object

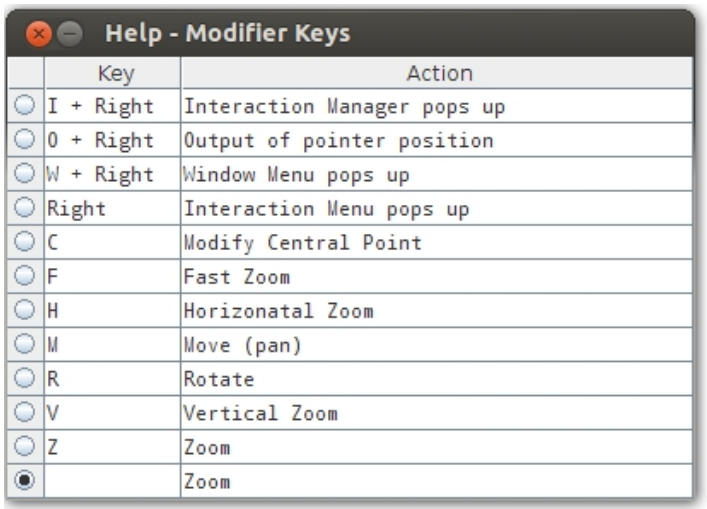




- Associations work the same for hits and tracks, try coloring the hits by track

Mouse modifiers

- Mouse modifiers are keys you hold down to change the default behavior of an interaction tool
- For example: hold down the M key when using the zoom tool to change zooming into moving, or R to rotate the detector
- The modifier keys for the currently active interaction can be shown if you select modifier keys from the help menu



Hands-on Session

- Now it is time for you to explore the rest of the events on your own
- In the events we have given you, you can find:
  - Single W and Z bosons
  - WZ and W events
  - Top quark pairs
  - Leptonic Higgs decays
- You can also look at the events you have produced yourself on the grid
- We will be walking around to help, do not hesitate to ask questions
- Also feel free to ask us about anything specific to your analysis or subdetector, there are many more features that we can show you
- Bonus: Can you reproduce the design from page 2?

More Informations

- If you want to learn more about Atlantis:
  - Sign up for the hypernews hn-atlas-AtlantisDisplay@cern.ch
  - Sign up for one of our (yearly) advanced tutorials to discover many more features that can help you to better understand your events
  - Check out http://atlas-live.cern.ch and go to Collaboration site to download XML files of the most recent collisions