

Event Display with HSF/Phoenix

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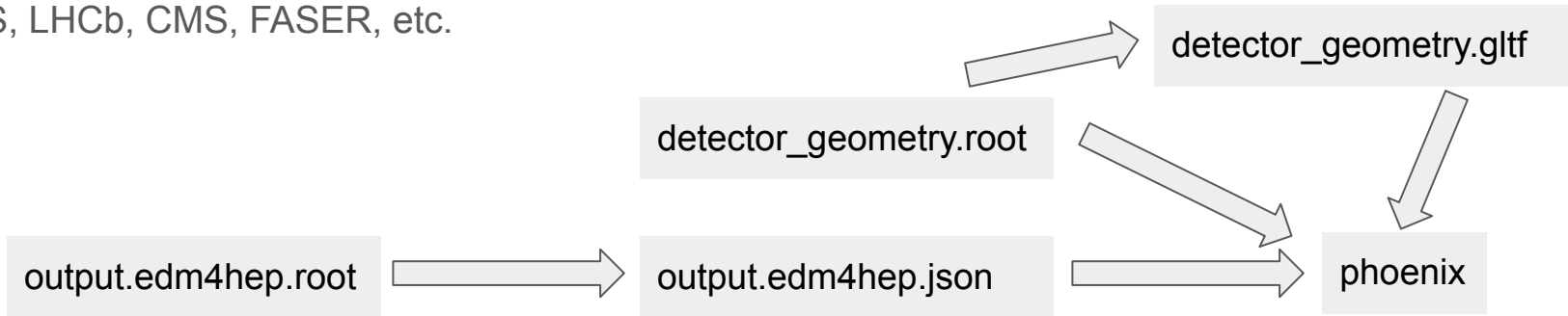
Phoenix Event Display (<https://github.com/HSF/phoenix>)

Experiment independent web-based event display for High Energy Physics developed and maintained by HEP software foundation.

- Allows loading detector geometry in root or json format.
- Allows loading hit collections or edm4hep objects in json format.
- Web-based playground interface available. But we can also create our own instance.

Experiments supported by phoenix:

ATLAS, LHCb, CMS, FASER, etc.



Run Test Sim

Step-by-Step Demonstration

Build epic and export desired geometry

```
./eic-shell
git clone https://github.com/eic/epic
cd epic
cmake -DCMAKE_INSTALL_PREFIX=install -S . -B build
cmake -build build -j 8
cmake -install build
source install/setup.sh
dd_web_display -export epic_tracking_only.xml
```

This will create a geometry file called **detector_geometry.root**

Run test sim

```
ddsim --compactFile epic_tracking_only.xml -G --gun.particle 'pi-' --gun.momentumMin
'1*GeV' --gun.momentumMax '20*GeV' --gun.distribution 'uniform' -N 2000 --outputFile
sim_output.edm4hep.root
```

Convert to json format

Step-by-Step Demonstration

Converting to JSON format

Requires edm4hep \geq 0.7.2. Currently eic-shell container is at 0.7.0 due to conflicts with root macros. There is a tagged container for testing at this point.

```
singularity pull docker://eicweb/jug_x1:unstable-mr-290-461

singularity run -B <folder containing rootfile> jug_x1_unstable-mr-290-461.sif

edm4hep2json <folder containing rootfile>/sim_output.edm4hep.root -l VertexBarrelHits
-n 100 -o sim_output.edm4hep.json
```


Web Interface

Step-by-Step Demonstration

Currently hosted on google cloud platforms here : <https://phoenix4eic.uc.r.appspot.com/>




Application for visualizing High Energy Physics data.



Playground
Get started with the default Phoenix features.


1

Show




Geometry display
This test should show some simple geometry.

Show




ATLAS
Show the ATLAS detector. One simple event.

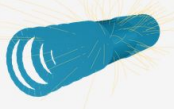
Show



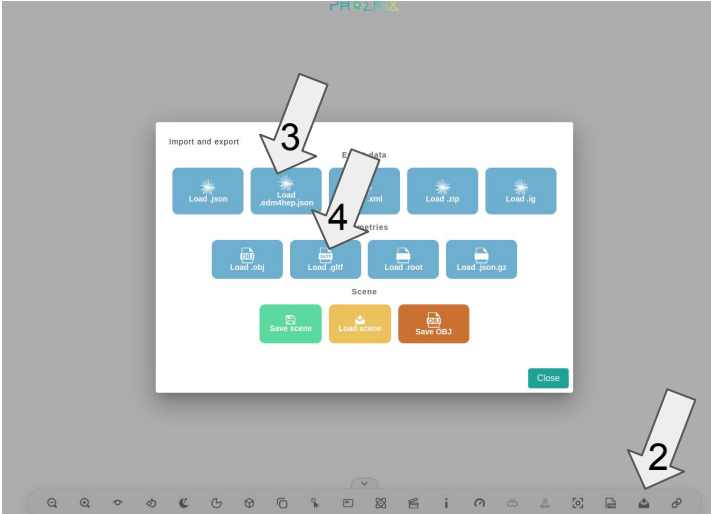
LHCb
Show the LHCb detector. One simple event.



CMS
Show the CMS detector. One simple event.

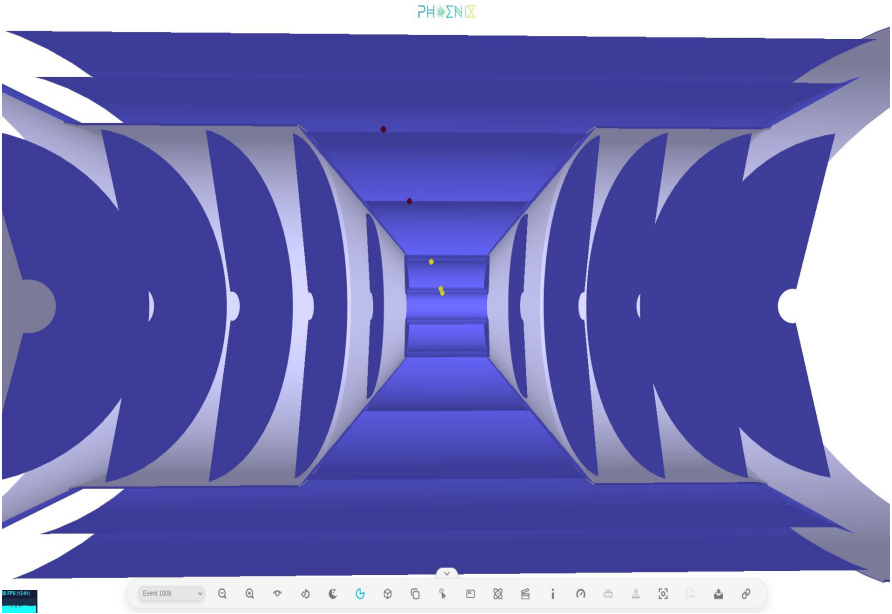


TrackML
Visualisation for TrackML. Shows how to write a custom event.

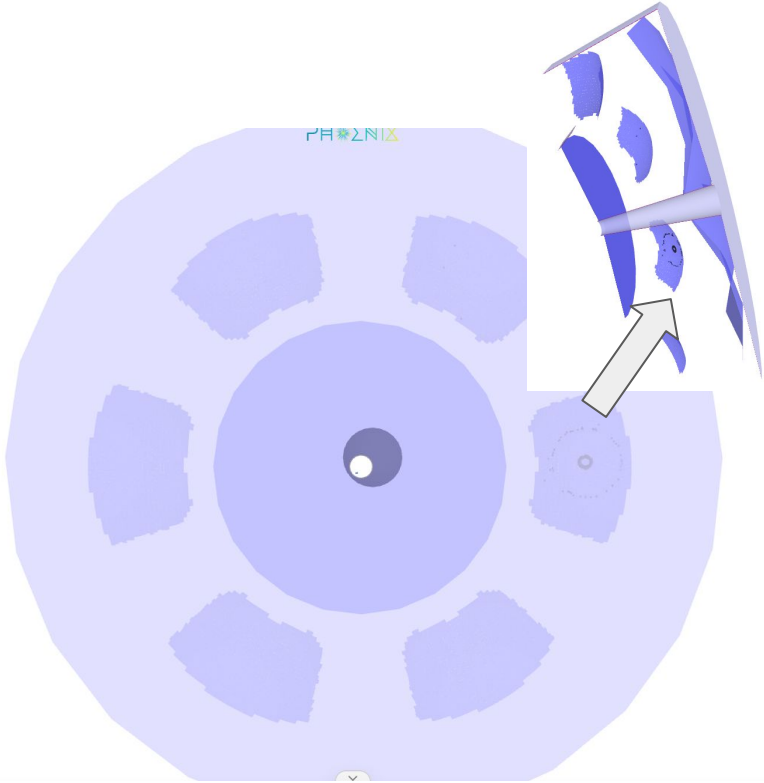


The screenshot shows the Phoenix application interface with an 'Import and export' dialog box open. The dialog box has three sections: 'Import and export', 'Export data', and 'Scene'. The 'Import and export' section contains buttons for 'Load .json', 'Load .ndsl', 'Load .json.gz', 'Load .zip', and 'Load .ig'. The 'Export data' section contains buttons for 'Load .obj', 'Load .glb', 'Load .root', and 'Load .json.gz'. The 'Scene' section contains buttons for 'Save scene', 'Load scene', and 'Save OBJ'. A 'Close' button is located at the bottom right of the dialog box. Three numbered arrows point to specific buttons: arrow 2 points to the 'Save OBJ' button, arrow 3 points to the 'Load .ndsl' button, and arrow 4 points to the 'Load .glb' button.

Example Visualizations

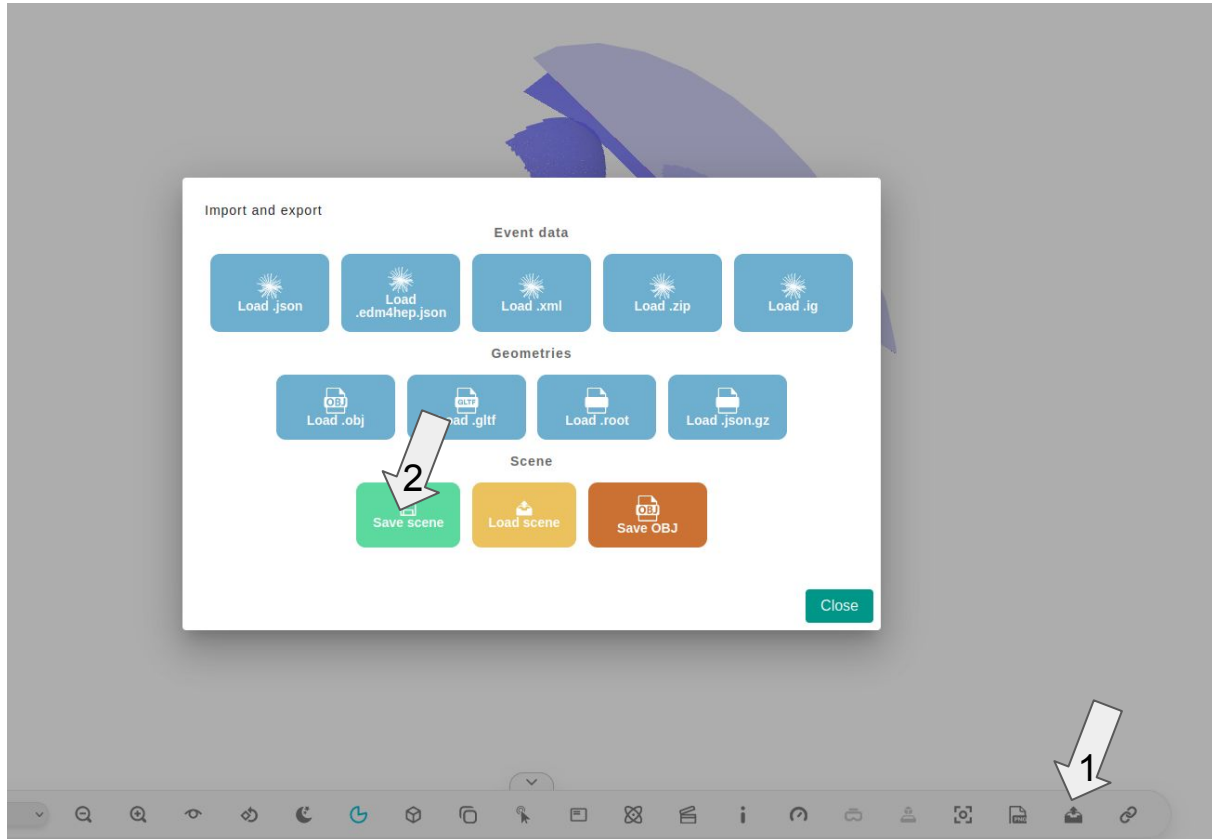


Central Tracker Hits



DRICH Hits

You can also save scene with event data to view later



Setting up phoenix locally

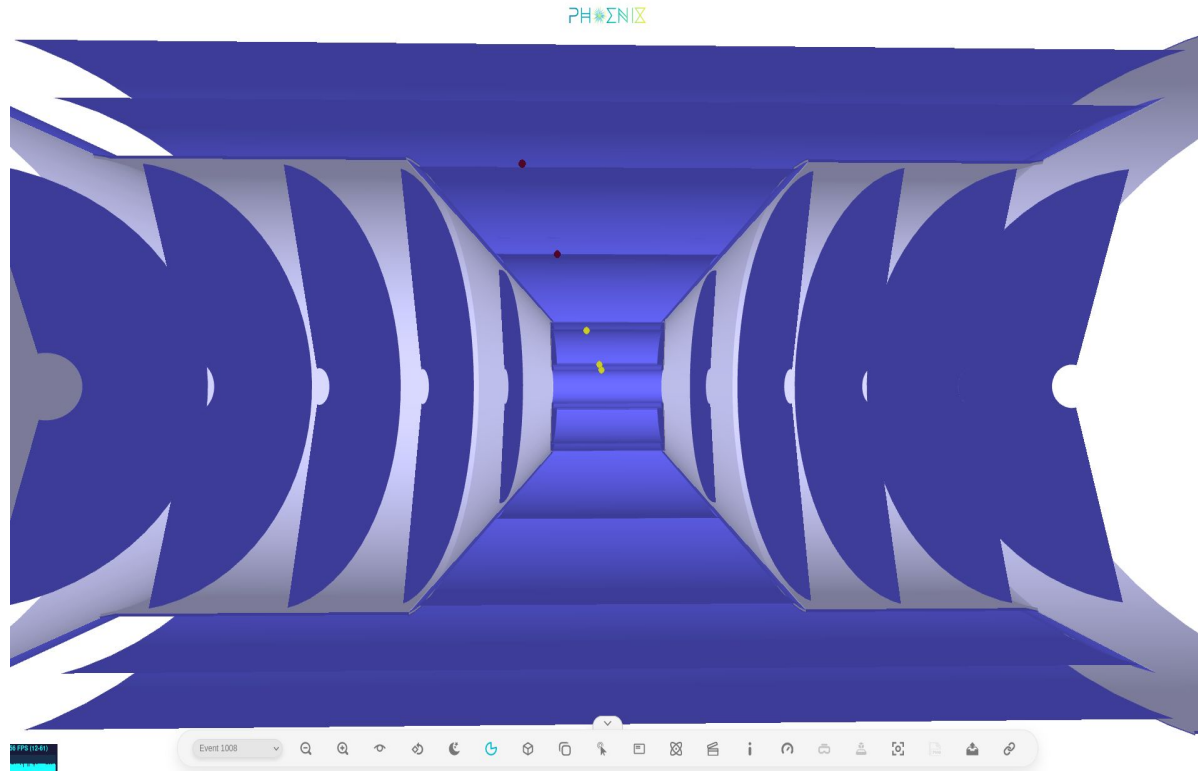
Step-by-Step Demonstration

Building phoenix (Tested with Ubuntu 22.04 LTS)

```
curl -fsSL https://deb.nodesource.com/setup_lts.x | sudo -E bash -  
  
sudo apt-get install -y nodejs  
  
curl -sL https://dl.yarnpkg.com/debian/pubkey.gpg | gpg --dearmor | sudo tee /usr/share/keyrings/  
yarnkey.gpg >/dev/null  
  
git clone https://github.com/hsf/phoenix  
  
cd phoenix  
  
yarn install  
  
yarn start
```

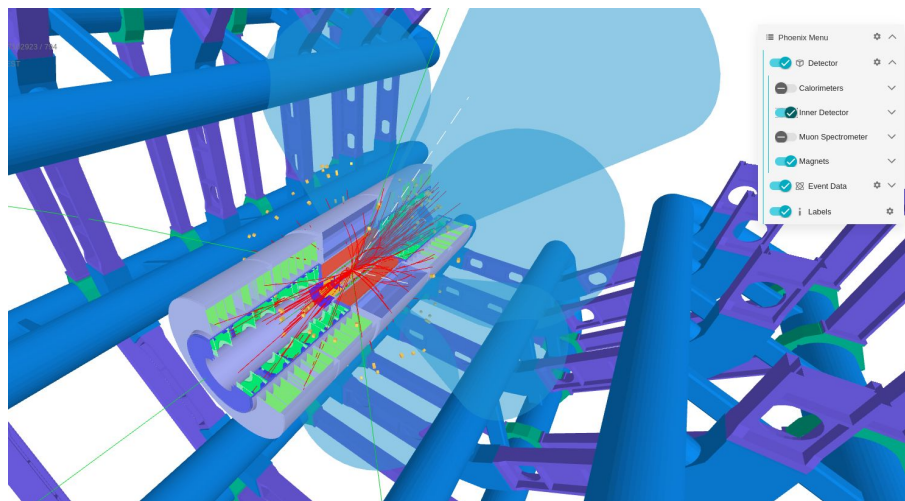
Open a browser and go to <http://localhost:4200>

Upload the detector geometry in root or json format and the edm4hep json file to phoenix playground



To Do

- Create default geometry views so that only the event json file is needed to be provided by the user
- Incorporating track projections (A RK propagator is provided with phoenix. Need to provide magnetic field info.)
- This is a 0.0 iteration. Plan to slowly integrate user friendly features customized to ePIC. Looking at examples from other projects built on phoenix like ATLAS (shown below).



More information

https://indico.cern.ch/event/916410/contributions/3852667/attachments/2051044/3437881/Phoenix_HSF_04062020.pdf

<https://indico.cern.ch/event/941278/contributions/4084836/attachments/2149508/3623867/Phoenix%20WLCGHSF%202020.pdf>