Event Display with HSF/Phoenix

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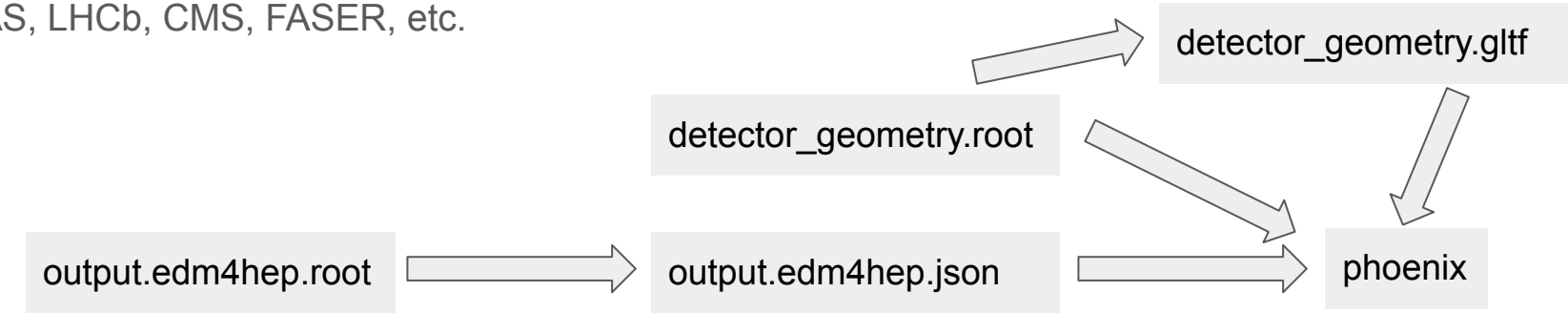
Phoenix Event Display (https://github.com/HSF/phoenix)

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

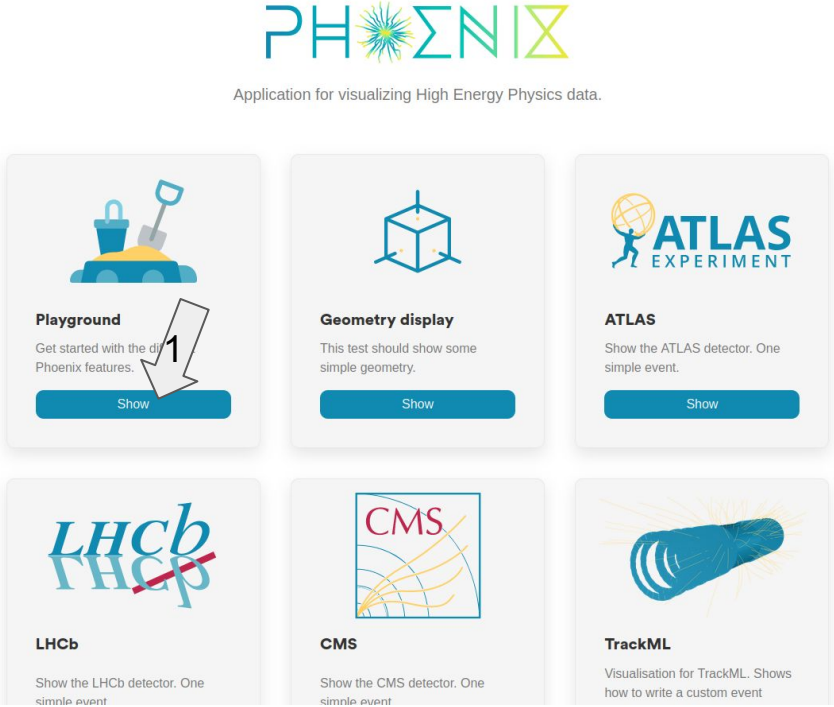
Requires edm4hep>=0.7.2. Currently eic-shell container is at 0.7.0 due to conflicts with root macros. There is a tagged container for testing at this point.

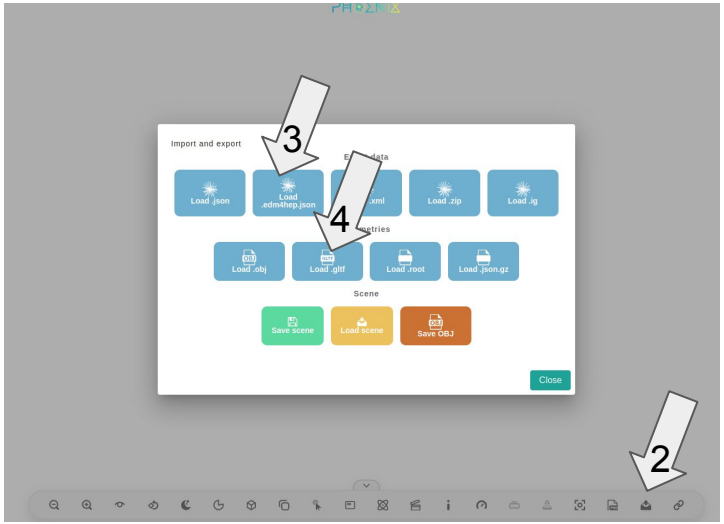
```
singularity pull docker://eicweb/jug_xl:unstable-mr-290-461

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

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

Web Interface

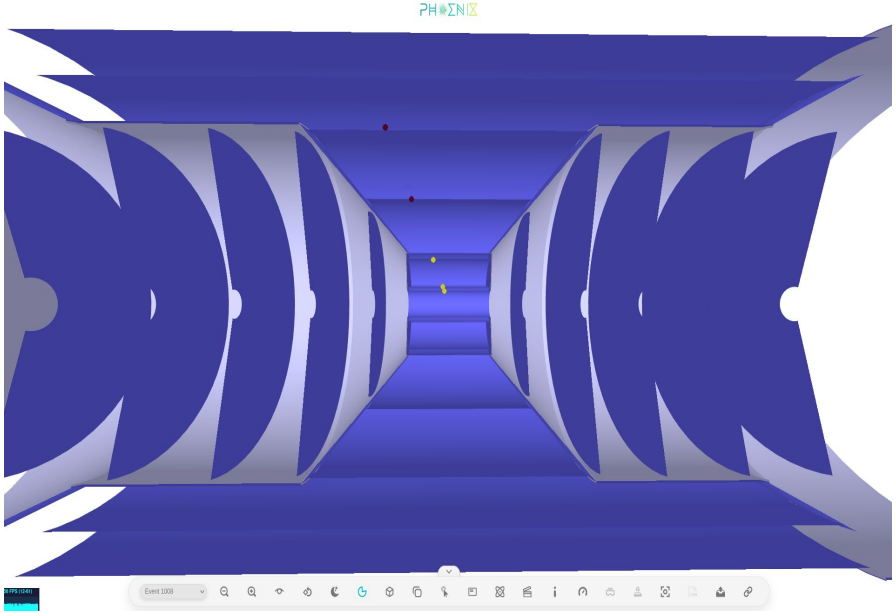
Step-by-Step Demonstration

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

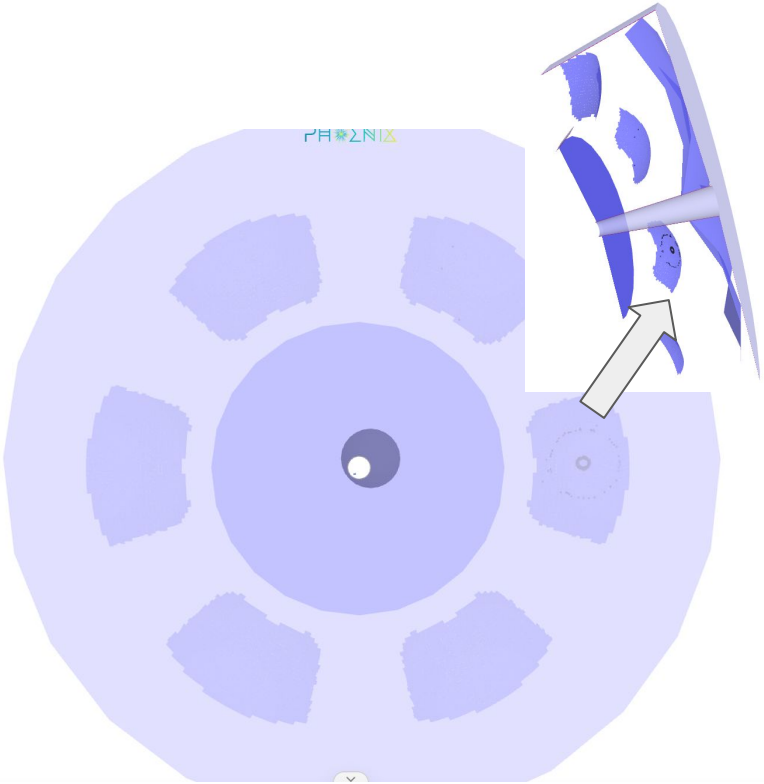




Example Visualizations

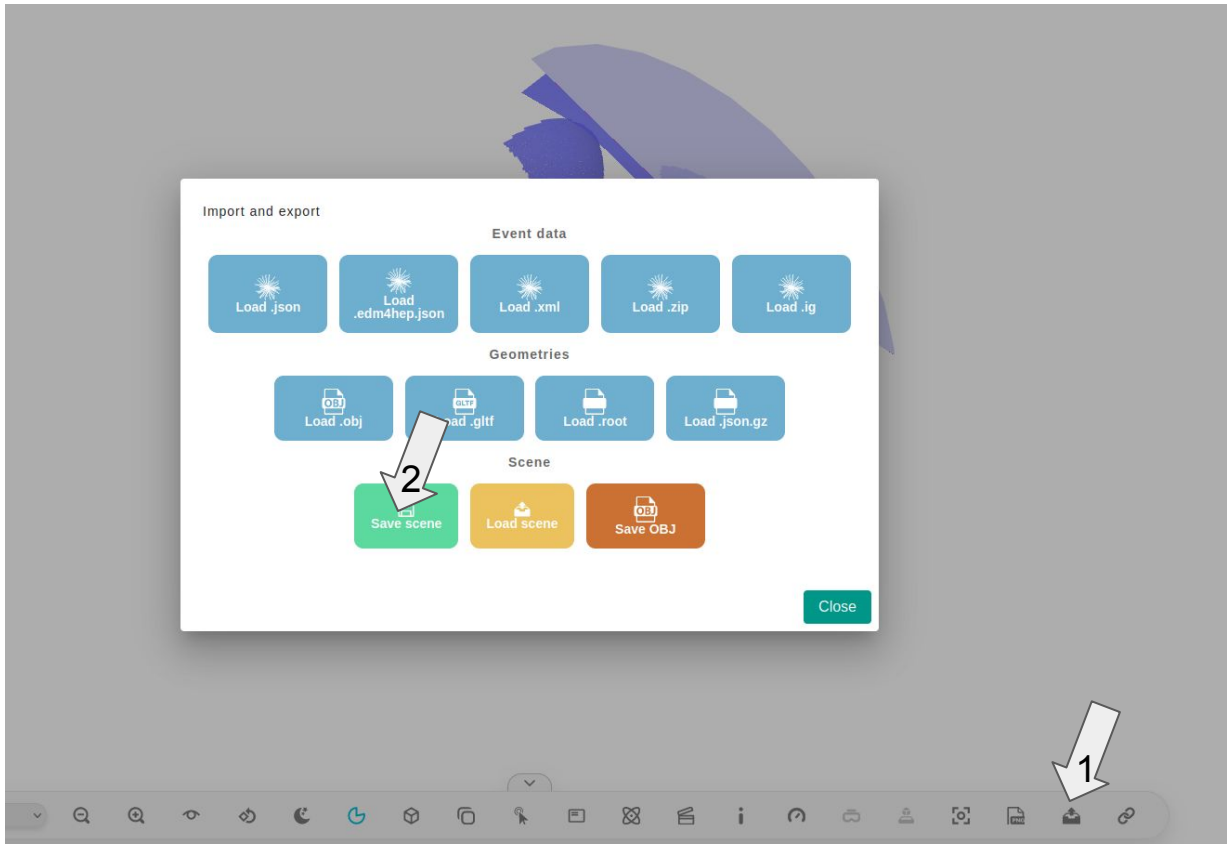


Central Tracker Hits



DRICH Hits

You can also save scene with event data to view later



Setting up phoenix locally

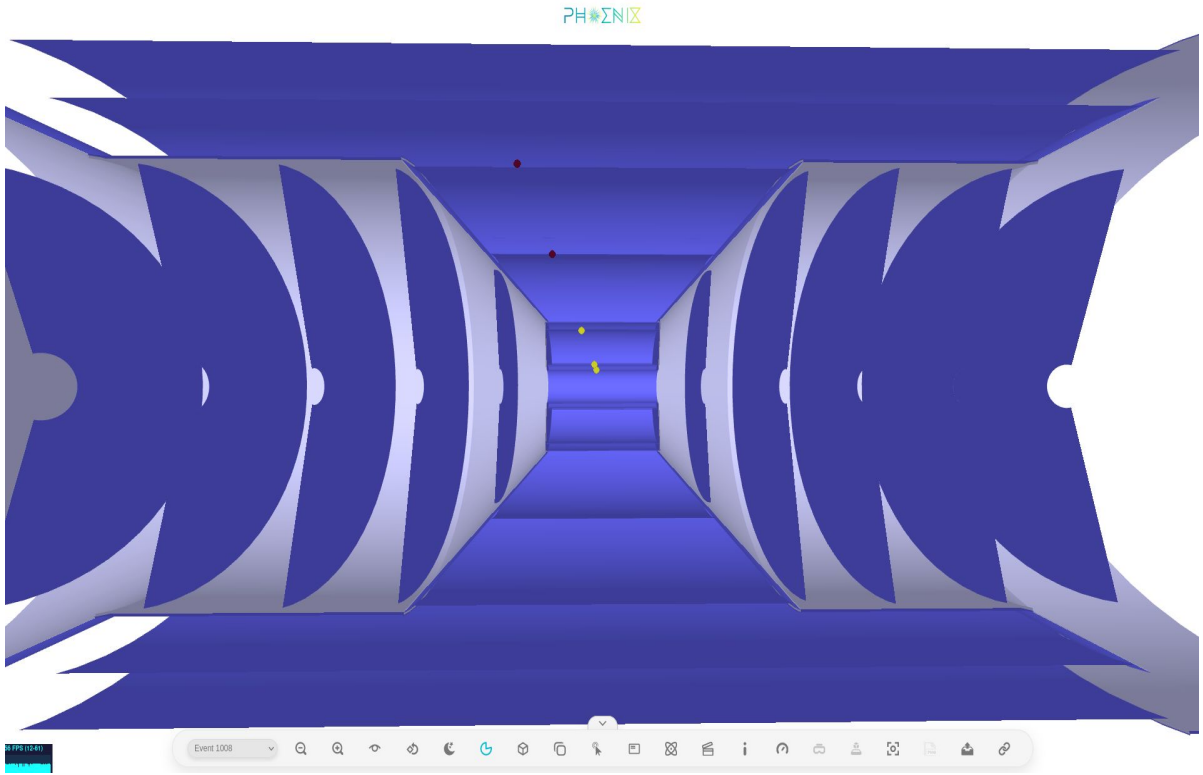
Step-by-Step Demonstration

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
```

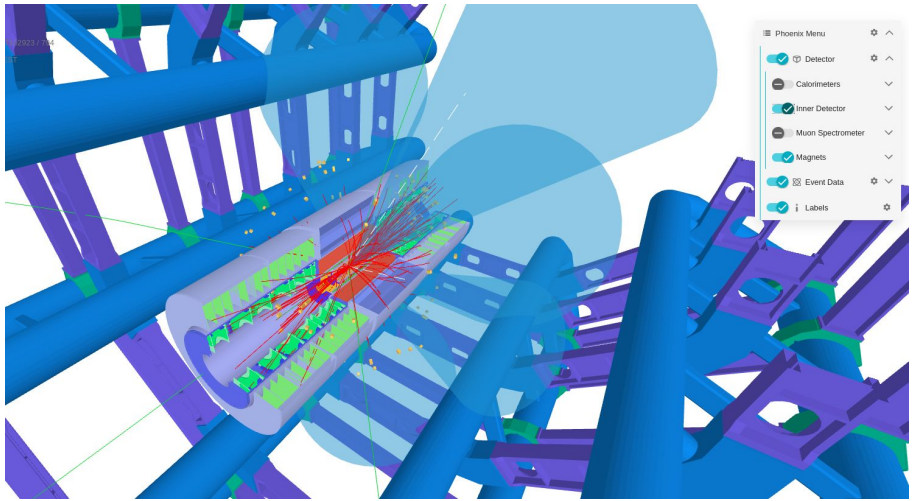
Open a browser and go to http://localhost:4200

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