



VISUALISATION DEVELOPMENTS IN GEANT4 10.5 AND FOR 10.6

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GEANT4 COLLABORATION MEETING JEFFERSON LAB

23-27 SEPTEMBER 2019

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- `vis-V10-04-14`: `/vis/drawVolume pv-name` draws all occurrences of `pv-name`
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- Tips about `/vis/drawVolume` and `/vis/scene/add/volume`

- DEVELOPMENTS IN THE PIPELINE FOR 10.6

- `vis-V10-05-05`: Visualisation of overlaps in `/vis/drawLogicalVolume`
- `vis-V10-05-08` (Mike Kelsey): `/vis/scene/add/electricField`
- `vis-V10-05-10`: `/vis/viewer/centreOn` and `/vis/viewer/centreAndZoomInOn`
- `vis-V10-05-12`: `/vis/set/extentForField` and `/vis/set/volumeForField`
- `vis-V10-05-14`: `/vis/viewer/set/style cloud`

ALREADY IN 10.5

ANIMATION WITH MOVING TIME WINDOW

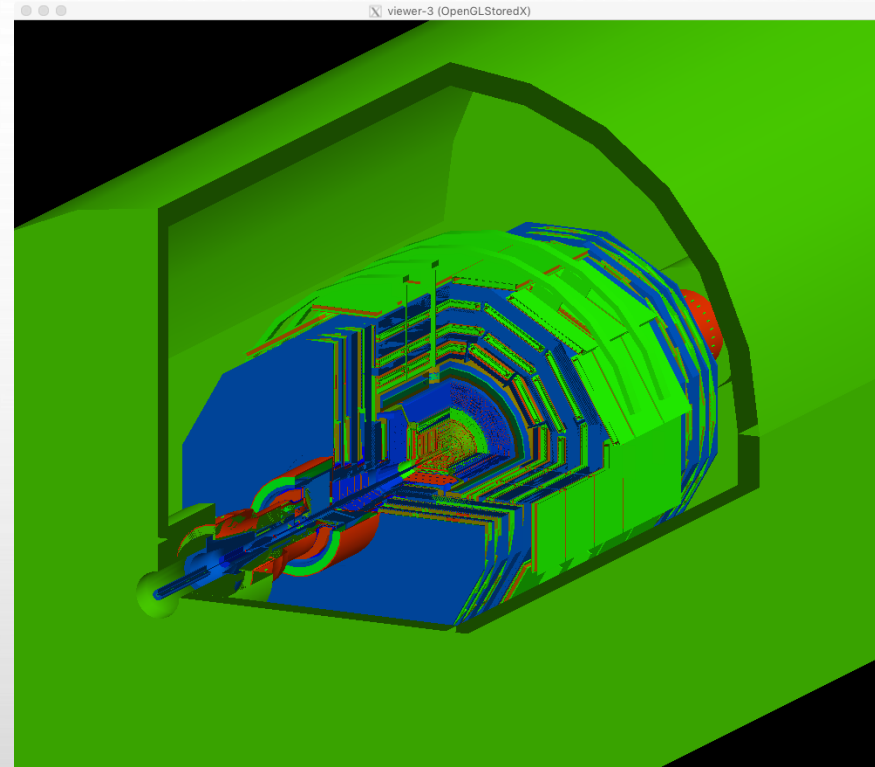
- NOW ONE CAN USE `/vis/viewer/interpolate` TO MAKE A MOVIE OF PARTICLES MOVING THROUGH TIME
- SEE GUIDANCE ON `/vis/viewer/set/timewindow/` COMMANDS
- TYPICAL CASE—SEE TEXT BOX

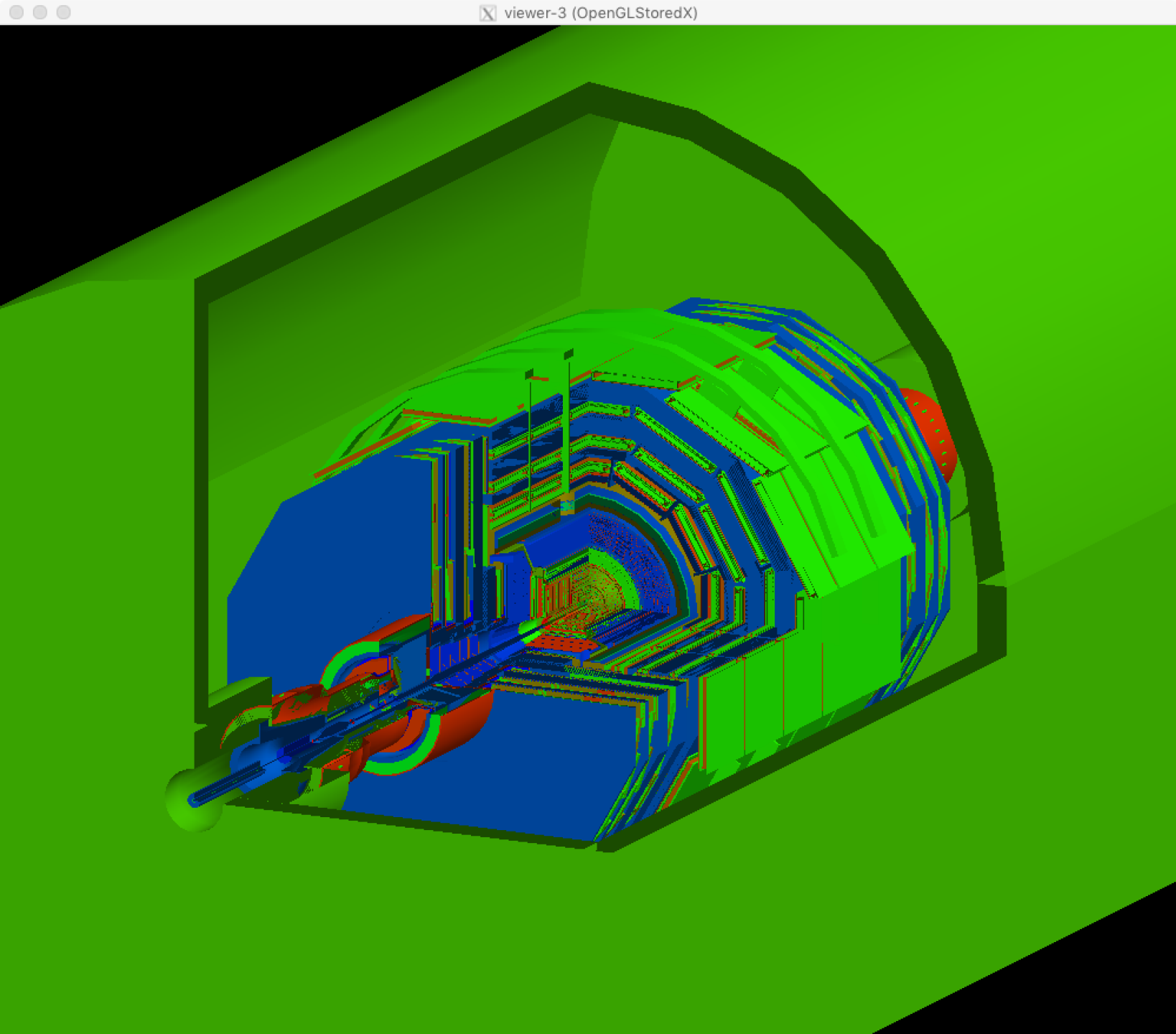
```
/vis/scene/add/trajectories rich
/vis/modeling/trajectories/drawByCharge-0/default/setTimeSliceInterval 0.01 ns
/vis/viewer/set/timeWindow/displayLightFront true 0 0 -50 cm -0.5 ns
/vis/viewer/set/timeWindow/displayHeadTime true
/vis/viewer/set/timeWindow/fadeFactor 1
/run/beamOn # or several until you get a good event or events
/vis/viewer/set/timeWindow/startTime 0 ns 1 ns
/vis/viewer/save
/vis/viewer/set/timeWindow/startTime 1 ns 1 ns
# then zoom, pan etc. to a view of interest and
/vis/viewer/save
# then repeat with next start time, another view and a save, then try
/vis/viewer/interpolate
```

Note: `/vis/viewer/interpolate` only works on OGLSX at the moment. We are hoping to fix it for Qt soon.

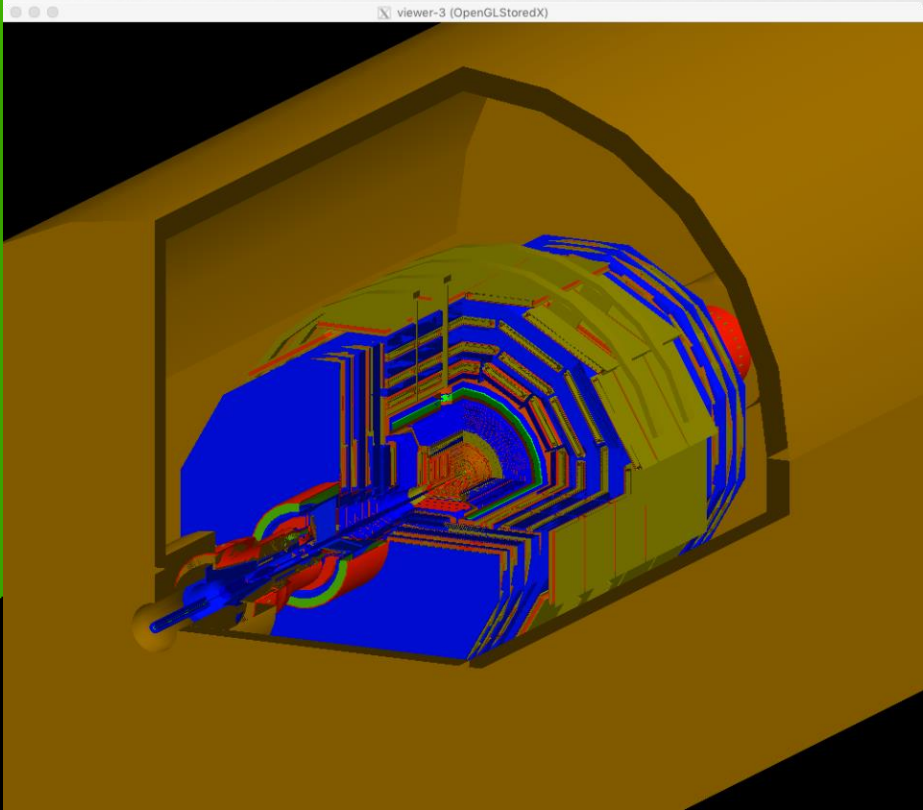
/vis/viewer/colourByDensity

- VOLUMES THAT HAVE NO VIS ATTRIBUTES CAN BE COLOURED BY DENSITY
 - GDML files quite often have no vis attributes





```
$ load_gdml cms.gdml
..
/vis/viewer/set/viewpointThetaPhi 30. 30.
/vis/viewer/zoomTo 25
/vis/viewer/clearCutawayPlanes
/vis/viewer/addCutawayPlane 0 0 0 m 0 0 -1
/vis/viewer/addCutawayPlane 0 0 0 m -1 0 0
/vis/viewer/addCutawayPlane 0 0 0 m 0 -1 0
/vis/viewer/set/style surface
/vis/viewer/colourByDensity 1 g/cm3 .5 3 10 # left
/vis/viewer/colourByDensity 1 g/cm3 .5 5 8 # below
```



DETECTOR DRAWING

- `/vis/drawVolume` AND `/vis/scene/add/volume`
 - The former calls the latter, but in addition opens a new scene.
 - The guidance is identical.
 - No argument—the whole detector is drawn.
 - But you can be selective. To add components one by one:
`/vis/drawVolume vol1`
`/vis/scene/add/volume vol2`
etc.
- BOTH COMMANDS
 - add all occurrences of named volume
 - take regular expressions and adds all matches

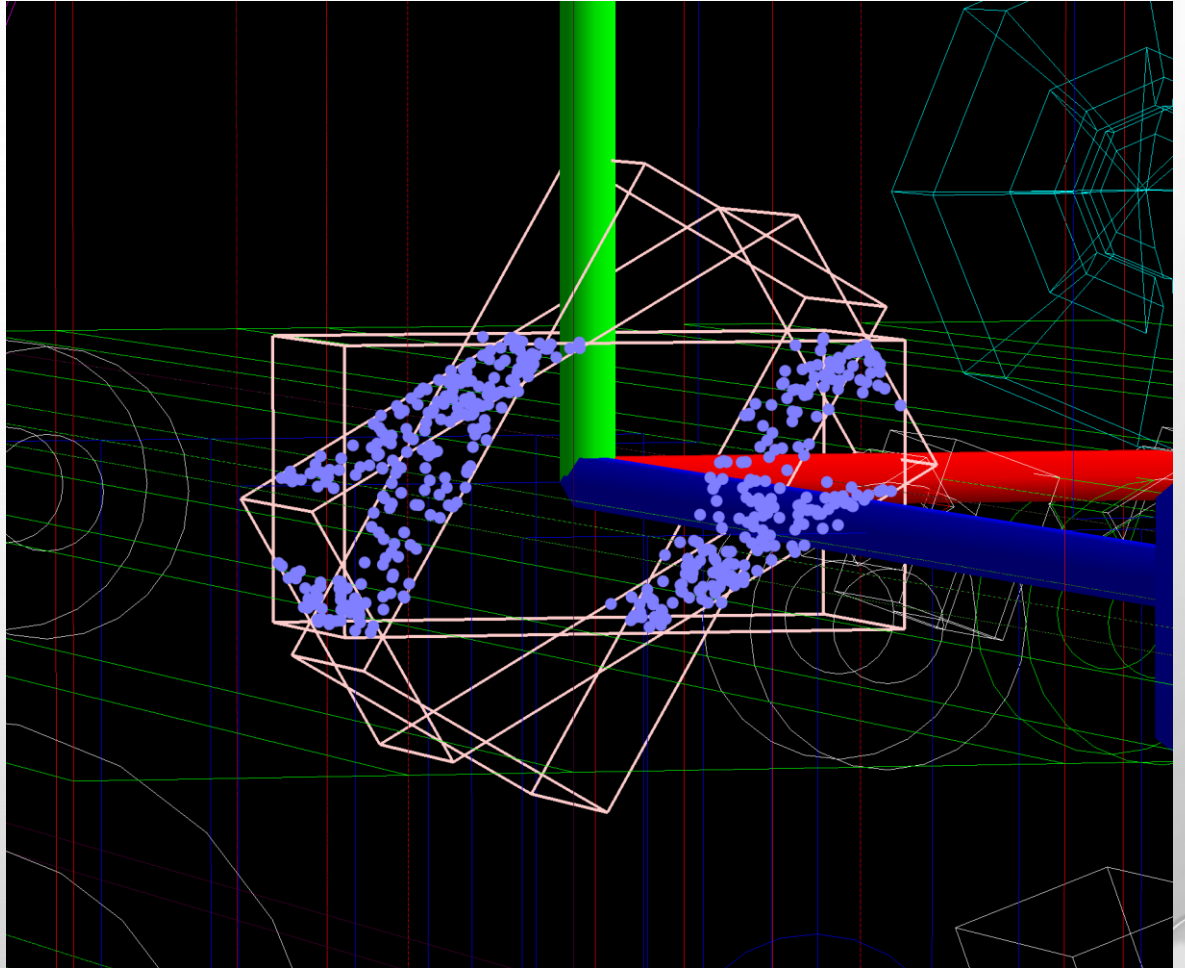
If physical-volume-name is "world" (the default), the top of the main geometry tree (material world) is added. If "worlds", the top of all worlds - material world and parallel worlds, if any - are added. Otherwise a search of all worlds is made. In the last case (a search of all worlds) all physical volume names are matched against the first argument of this command. If this is of the form `"/regexp/"`, where `regexp` is a regular expression (see C++ `regex`), the physical volume name is matched against `regexp` by the usual rules of regular expression matching. Otherwise an exact match is required. For example, `"/Shap/"` matches "Shape1" and "Shape2".



SCHEDULED FOR 10.6

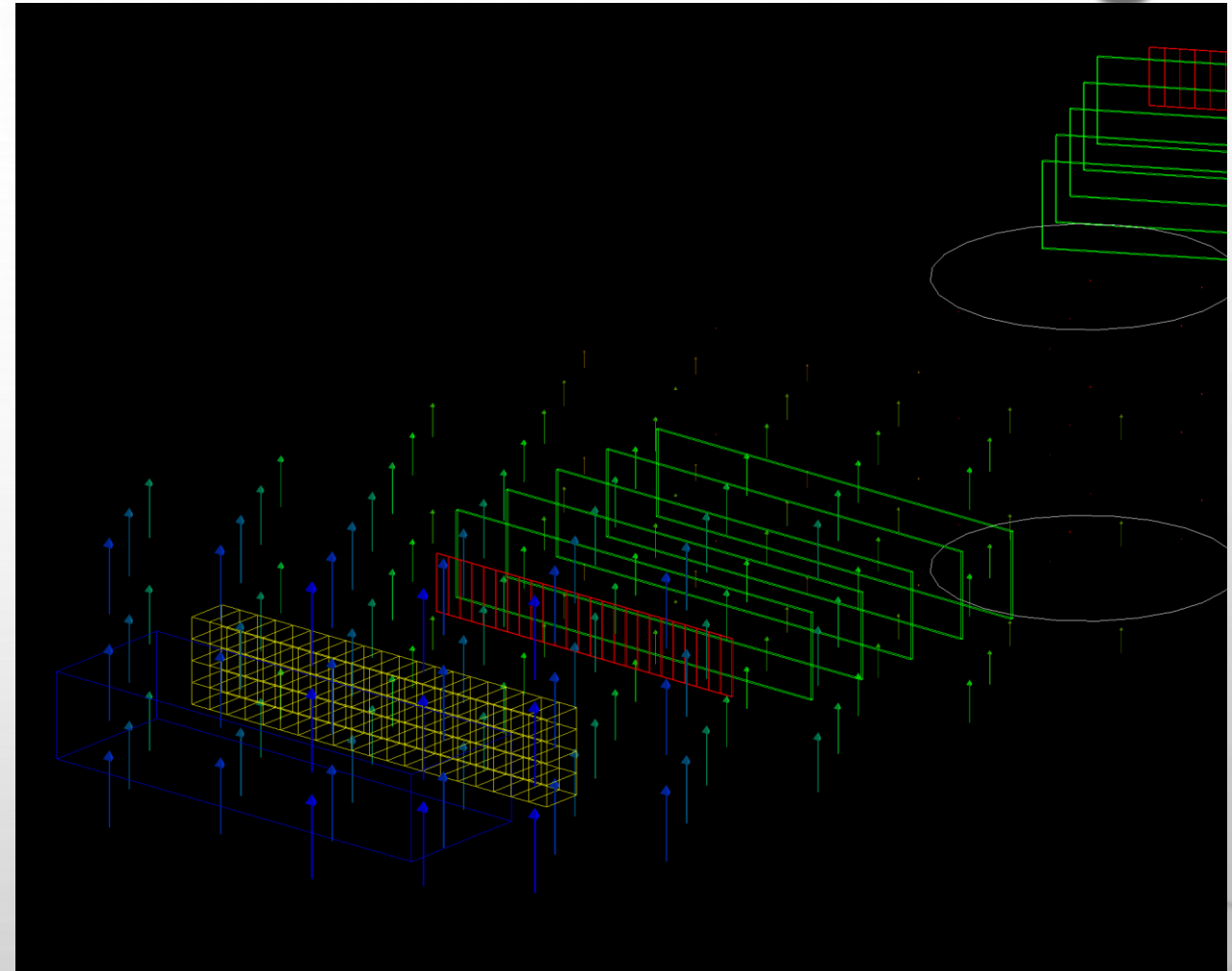
VISUALISATION OF OVERLAPS

- `/vis/drawLogicalVolume`
 - Uses `/vis/scene/add/logicalVolume` and opens a new scene.
 - See guidance.
 - By default prints and draws overlaps.



VISUALISATION OF FIELDS

- `/vis/scene/add/magneticField`
- `/vis/scene/add/electricField` (MIKE KELSEY)
- `/vis/set/extentForField` AND `/vis/set/volumeForField`
 - With these commands you can limit the extent over which the field is drawn. This would help, for example, if drawing over the whole scene produced so many arrows or lines that it clutters the scene.
 - See guidance for further explanation.



CENTRING

- `/vis/viewer/centreOn` AND `/vis/viewer/centreAndZoomInOn`
 - This allows one to centre the view (and zoom in) on a volume.
 - Reset with `/vis/viewer/reset`.
 - See movie—next slide.

```

s') { // "surface"
reframe:
newParameters::hsr);
r:
newParameters::hlhsr);
r:
hsr:
oud:
newParameters::hsr);
c') { // "cloud"
reframe:
newParameters::cloud);

```

test202

```

#/test202/select Twisted_Box false
#/test202/select Twisted_Trd false
#/test202/select Another_Twisted_Trd false
#/test202/select G4Paraboloid false
#/test202/select G4GenericTrap false
#/test202/select Simple_tessellated false
#/test202/select Simple_union false
# Re-establish auto refreshing and verbosity:
/vis/viewer/set/autoRefresh true
/vis/viewer/refresh
G4OpenGLSceneHandler::AddSolid for G4TessellatedSolid "TestTess"
G4OpenGLSceneHandler::AddSolid for G4TessellatedSolid "TestTess"
/vis/verbose confirmations
Visualization verbosity changed to confirmations (4)
Idle> vviiss//vvii /vis/viewer/sseett//vvii /
vis/viewer/set/viewpointTT /vis/viewer/
set/viewpointThetaPhi 3300 3300

/vis/viewer/set/viewpointThetaPhi 30 30
Viewpoint direction set to (0.433013,0.25,0.866025)
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredX)"...
Viewer "viewer-0 (OpenGLStoredX)" refreshed.
(You might also need "/vis/viewer/update".)

```

Identity and Type

Name: G4VisCommandsViewerDefault.cc

Type: C++ Source

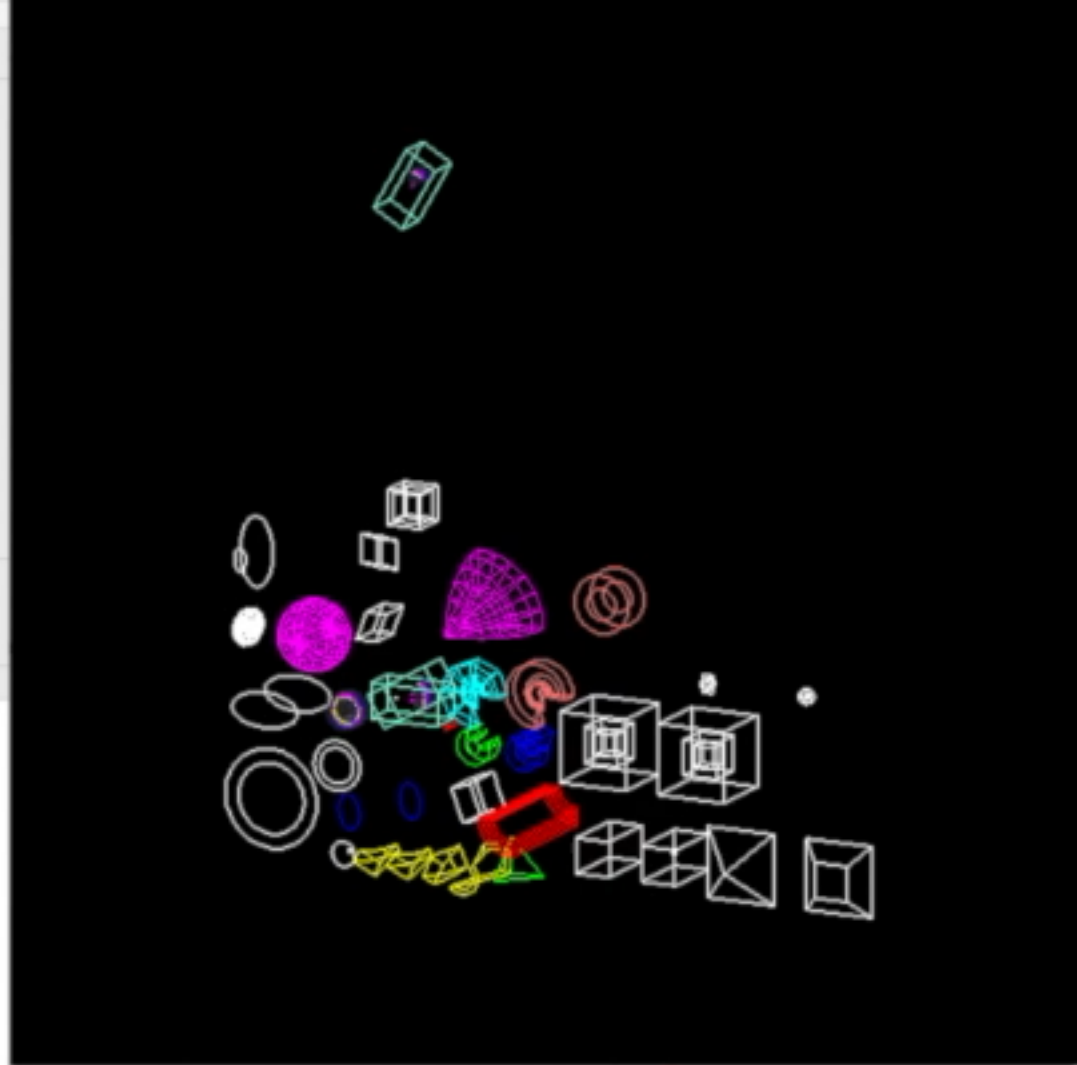
Location: Relative to Project

source/visualization/management/src/G4VisCommandsViewerDefault.cc

Full Path: /Users/johna/Geant4/geant4-dev/source/visualization/management/src/G4VisCommandsViewerDefault.cc

On Demand Resource Tags
Only resources are taggable

- Target Membership**
- ALL_BUILD
 - AnaEx01
 - B01
 - B02
 - B03
 - B1
 - B1Con
 - B2
 - B3
 - B3a
 - B3b
 - B4
 - B5
 - BlineTracer
 - Brachy
 - ChargeExchangeMC
 - CompositeCalorimeter
 - Continuous
 - DICOM
 - DICOM-library
 - DMX



```

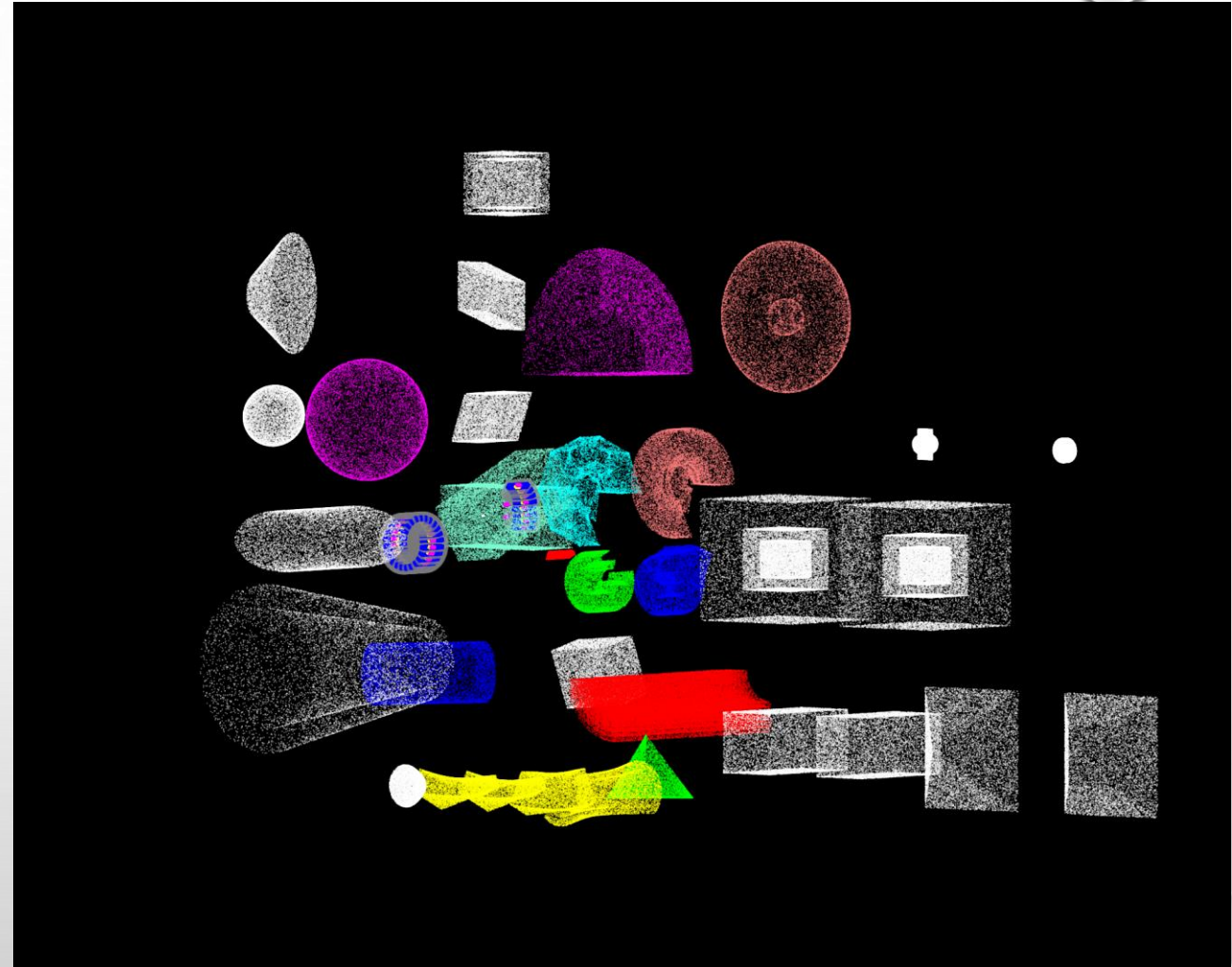
untedObjectIvE', size : 0.000961 MB
y pools allocated: 3; of which, static: 0
leted: 3 / Total memory freed: 0.0048 MB
=====
ects are deleted.
ed.
leted.
1 is deleted. Good bye :)

```

- BlineTracer
- Brachy
- ChargeExchangeMC
- CompositeCalorimeter
- Continuous
- DICOM
- DICOM-library
- DMX
- DirectAccess
- ExGflash
- ExLUCN

CLOUD DRAWING STYLE

- `/VIS/VIEWER/SET/STYLE CLOUD`
 - Cloud drawing uses solid->GetPointOnSurface, i.e., it uses kernel algorithms and by-passes polyhedral representations.
 - The solid is represented by a polymarker of dots.
 - The default number of points is 1000.
 - This can be changed with `/vis/viewer/set/numberOfCloudPoints`
 - If polyhedral representation fails, for example during Boolean processing, drawing falls back to cloud.
 - Can be CPU demanding.





THANKYOU