VizSchema – python & visit example use for gyro data, VsH5File.py API, schema specification issues

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(some notes on the current Python API for reading VizShema h5 data, May 10, 2011)

Gyro data used & their vizSchema compliant data

- /scr_oxygen/srinath/gyroruns/nl01/gyro00300.h5

- /scr_oxygen/srinath/gyroruns/nl01/gyro3D00300.h5

- VizSchema data:

  - both files contain a mesh dataset /cartMesh

  - both files contain "objects" (HDF5 datasets) with metadata that have attributes starting with "vs"

  - however, there are also datasets that do not have attributes starting with "vs" – these datasets are ignored by the VsH5File.py python API.
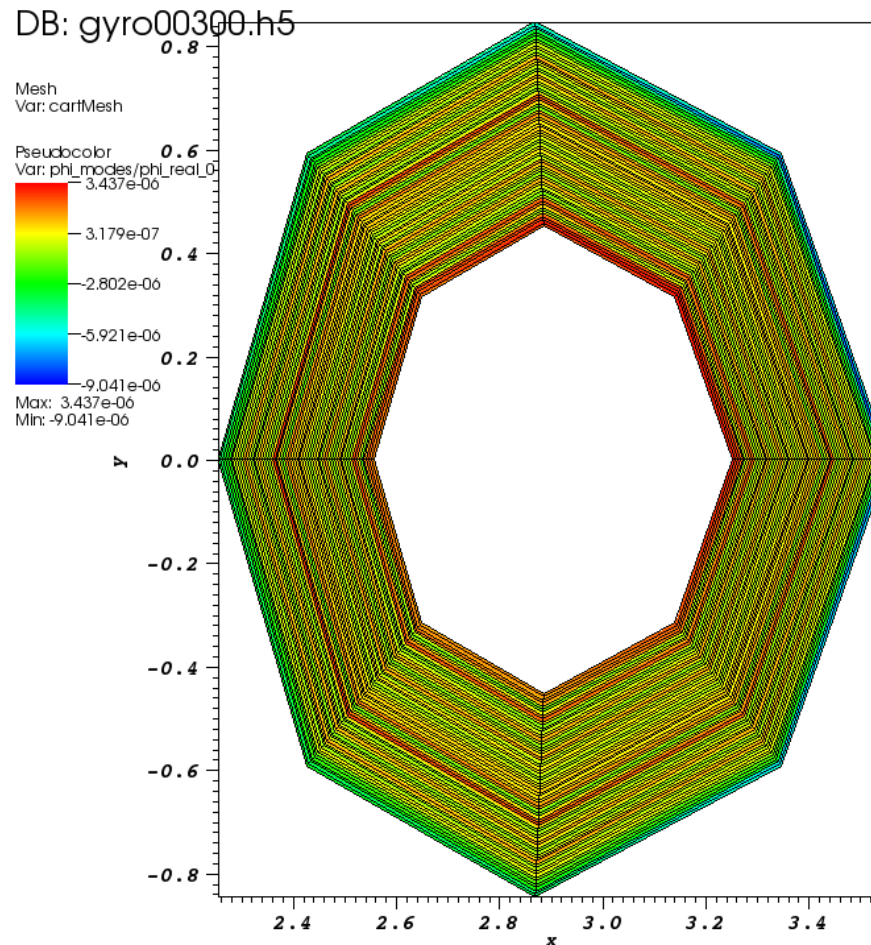
Plotting the mesh from python

- Using VsH5File.py to read the data and matplotlib to plot it
- The '/cartMesh' mesh data is obtained via one of the datasets '/phi_modes/phi_imag' that has a handle for the mesh associated with it.
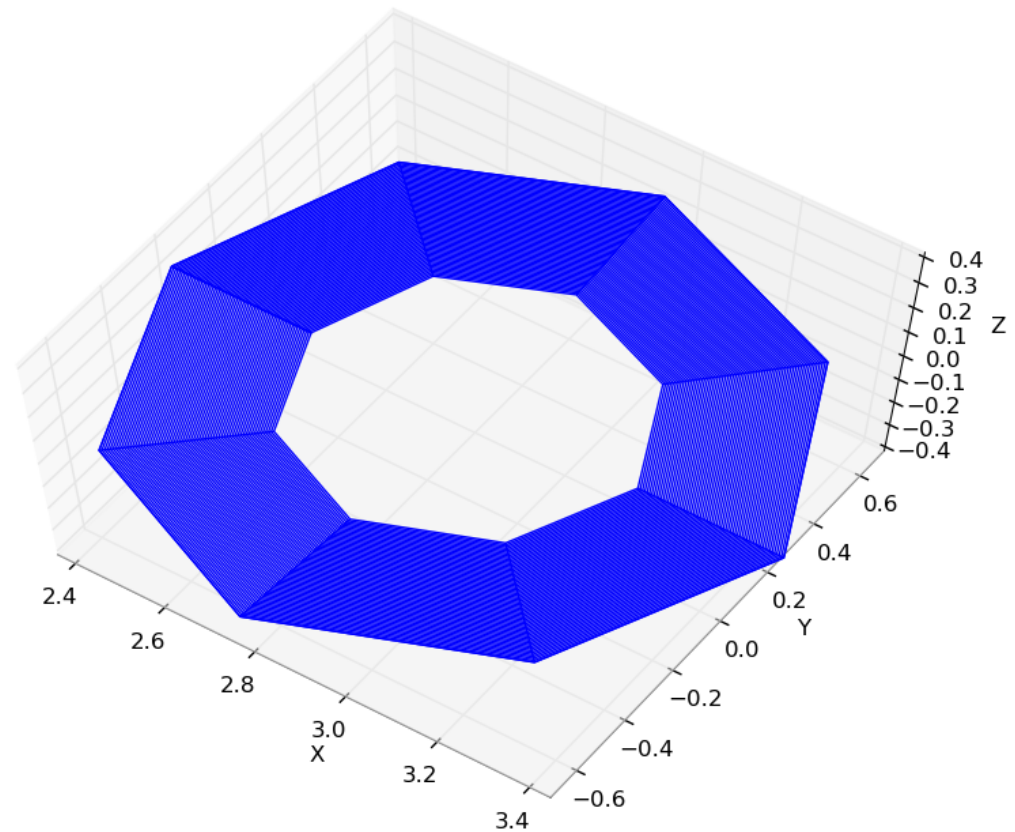
Plotting the mesh and the phi_imag mode data from visit

- Both examples use data from the gyro00300.h5 file.

Python source code that demonstrates using VsH5File.py

```python
from numpy import *
import pylab as p
import VsH5File
import mpl_toolkits.mplot3d.axes3d as p3
fileName = "gyro00300.h5"
vd = VsH5File.VsH5File(fileName)
vd.findDataSets()
md = vd.getDataSet('/phi_modes/phi_imag')
cartMesh = md.mesh.node
x = cartMesh[..., 0]
y = cartMesh[..., 1]
z = zeros(x.shape)
vd.close()
fig=p.figure()
ax = p3.Axes3D(fig)
ax.plot_wireframe(x,y,z)
ax.set_xlabel('X')
ax.set_ylabel('Y')
ax.set_zlabel('Z')
p.show()
```

```python
Import …
fileName =  "gyro3D00300.h5"
vd = VsH5File.VsH5File(fileName)
vd.findDataSets()
md = vd.getDataSet('/v_par_ion0')
cartMesh = md.mesh.node
x = cartMesh[..., 0]
y = cartMesh[..., 1]
z = cartMesh[..., 2]
x = x.reshape((x.shape[0], x.shape[1]*x.shape[2]))
y = y.reshape((y.shape[0], y.shape[1]*y.shape[2]))
z = z.reshape((z.shape[0], z.shape[1]*z.shape[2]))
vd.close()
fig=p.figure()
ax = p3.Axes3D(fig)
ax.plot_wireframe(x,y,z)
ax.set_xlabel('X')
ax.set_ylabel('Y')
ax.set_zlabel('Z')
p.show()
```
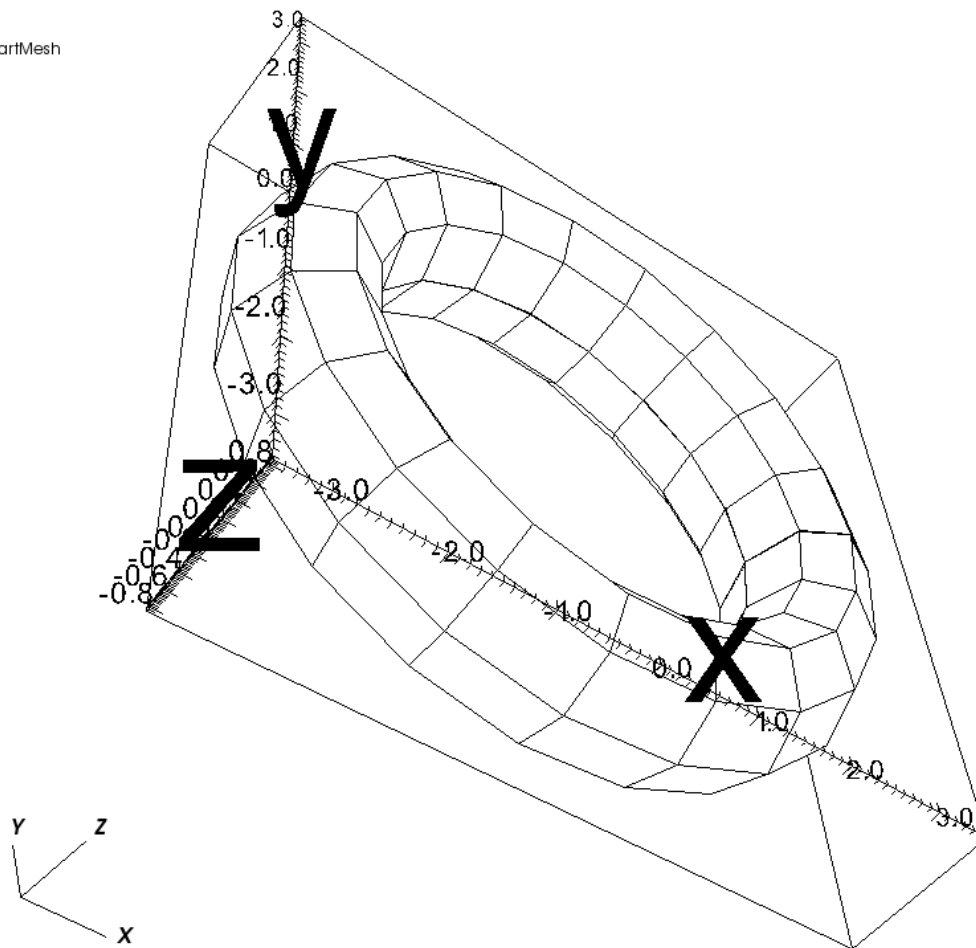
Plotting the full 3D mesh using visit…

- 3D examples use data from the gyro3D00300.h5 file.

… and from Python.

- 3D examples use data from the gyro3D00300.h5 file.

VsH5File.py python API - classes

VsH5Mesh

VsH5UniCartMesh **VsH5StructMesh** **VsH5PointMesh**

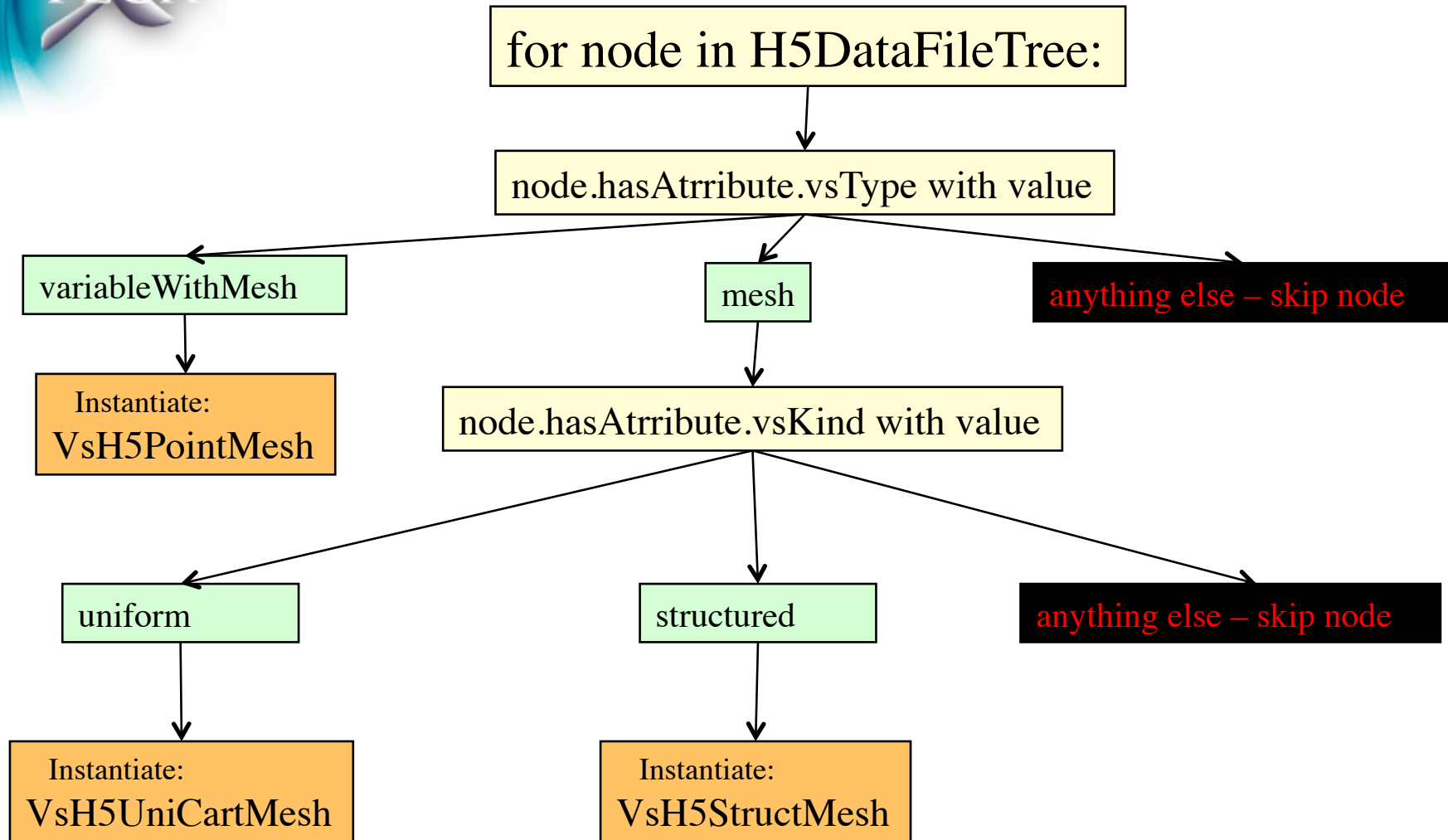**VsH5FileError** **VsH5Limits** **VsH5DataSet**
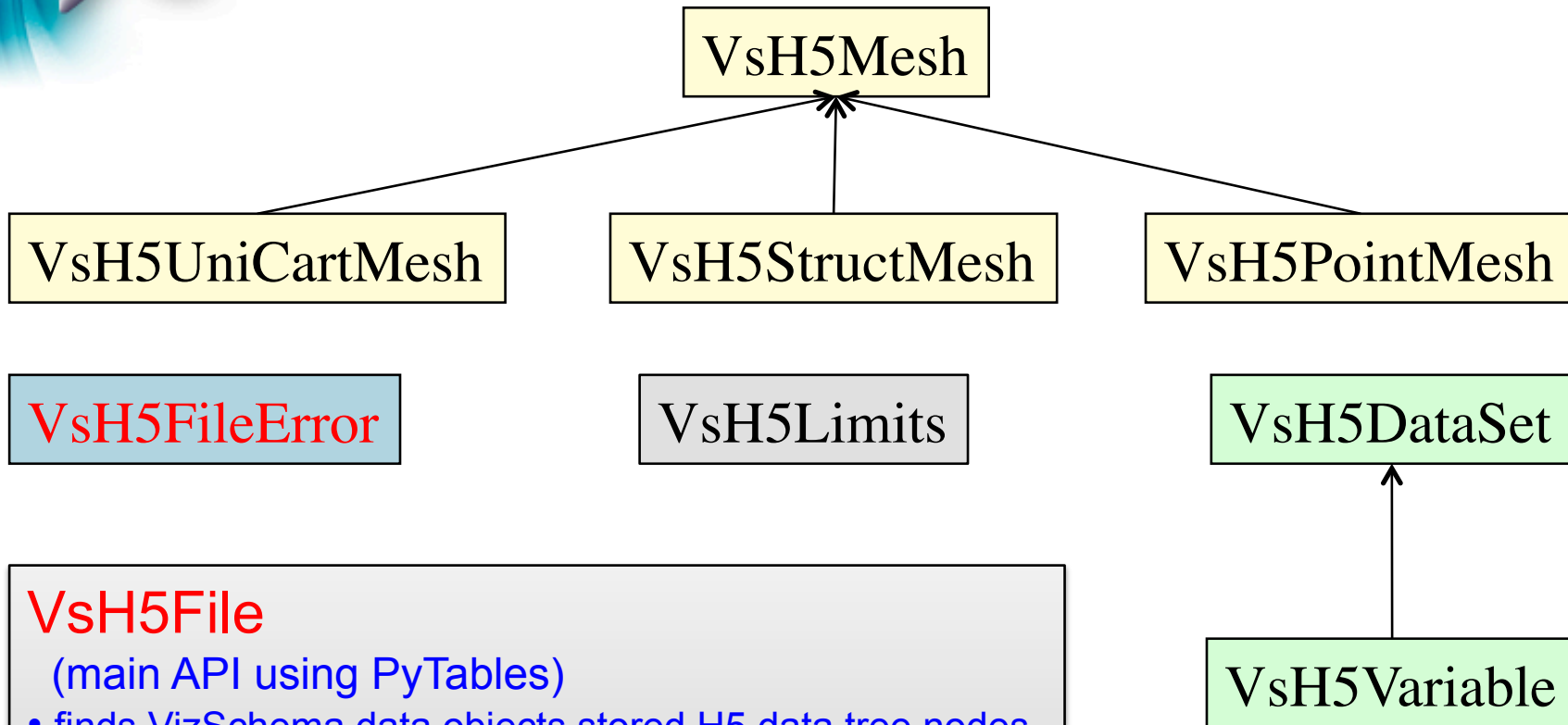
VsH5File

(main API using PyTables)
• finds VizSchema data objects stored H5 data tree nodes, instantiates VsH5Mesh and VsH5DataSet objects
• stores the meshes and data sets in dictionary data structures
• provides access to them with the raw data represented via numpy arrays.

VsH5Variable

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VsH5File.py python API – VizSchma supported meshes

```
for node in H5DataFileTree:
```

```
node.hasAtrribute.vsType with value
```

variableWithMesh

mesh

anything else – skip node

Instantiate:
VsH5PointMesh

```
node.hasAtrribute.vsKind with value
```

uniform

structured

anything else – skip node

Instantiate:
VsH5UniCartMesh

Instantiate:
VsH5StructMesh

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VizSchema specification and compliance questions

- What are the requirements on the official specification of VizSchema?

- How should the VizSchema specification be represented: XML, RDF/OWL, anything else?

- What should it mean for an h5 file to be VizSchema compliant? Currently, VsH5FileError is not thrown if an h5 file does not have a mesh object and datasets are attempted to be read in (python will generated an error since the mesh map is empty).

  – should partial VizSchema compliance be supported (effectively the current state)?

  – or strong compliance should be enforced?

  – or strong compliance should be enforced for required data and optional data be allowed as well.