

# Progress of $\mu$ BooNE Detector GDML

Adam Patch

October 21, 2010

# Outline

Progress of  
 $\mu$ BooNE  
Detector  
GDML

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GDML

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GDML Status

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1 GDML

2 Design Resources

3  $\mu$ BooNE GDML Status

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# Geometry Description Markup Language (GDML)

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- Similar to XML and HTML
- Used to describe geometrical attributes by either
  - defining parameters of packaged shapes, or
  - defining a 2D set of vertices and giving depth
- Can be visualized in ROOT by using TGeo class
- Used in GENIE for neutrino interaction
- Used in Geant4 for product propagation
- More information can be found at:  
<http://lcgapp.cern.ch/project/simu/framework/GDML/gdml.html>

# GDML Example

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```
<?xml version="1.0" encoding="UTF-8" ?>

<gdml xmlns:gdml="http://cern.ch/2001/Schemas/GDML"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:noNamespaceSchemaLocation="GDMLSchema/gdml.xsd">

  <define>
    <constant name="kWidth" value="100" />
  </define>

  <materials>
    <element name="argon" formula="Ar" Z="18">
      <atom value="39.9480"/>
    </element>

    <material name="LAr" formula="LAr">
      <D value="1.40" unit="g/cm3"/>
      <fraction n="1.0000" ref="argon"/>
    </material>
  </materials>

  <solids>
    <box name="SimpleBox" lunit="cm" x="kWidth" y="kWidth" z="kWidth"/>
  </solids>

  <structure>
    <volume name="volSimpleBox">
      <materialref ref="STEEL_STAINLESS_Fe7Cr2Ni"/>
      <position name="posBox" lunit="cm" x="0" y="0" z="0"/>
      <solidref ref="SimpleBox"/>
    </volume>
  </structure>

  <setup name="Default" version="1.0">
    <world ref="volSimpleBox" />
  </setup>

</gdml>
```

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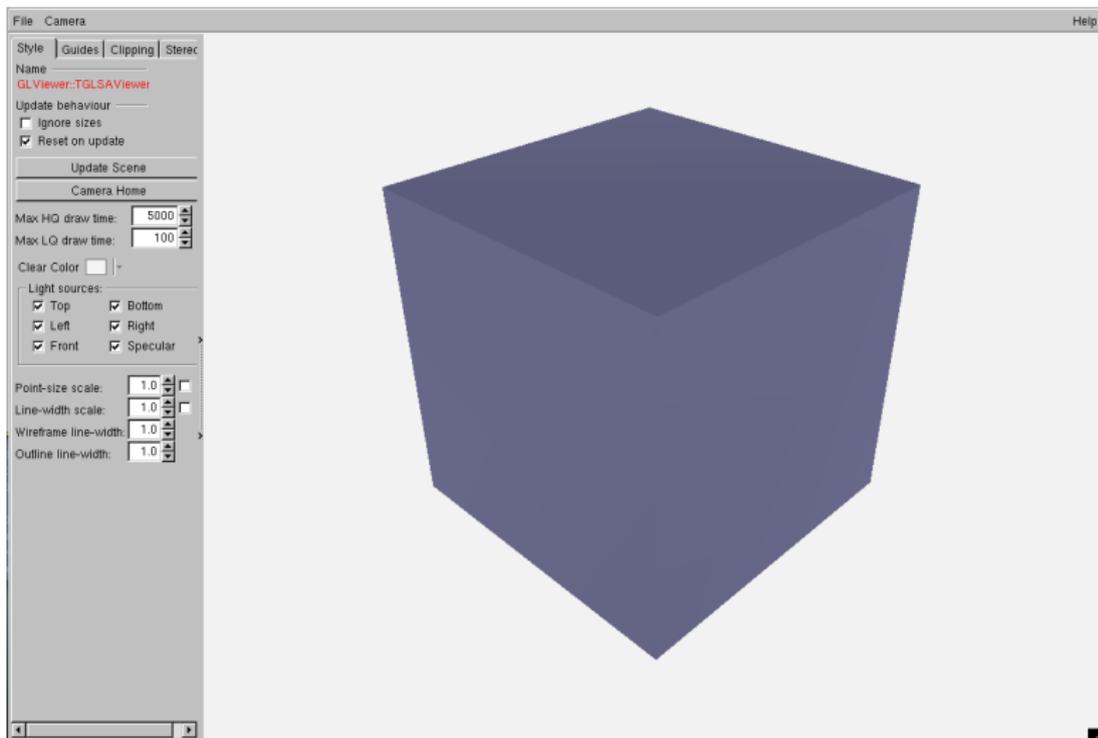
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# $\mu$ BooNE Geometry Resources

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- Initial scripts (wires, cryostat, TPC, GDML; generating scripts) from Brian Rebel
- PMT GDML from Ben Jones
- CAD file from Bo Yu<sup>1</sup>
- ArgoNeuT, BO, LBNE GDML scripts also available for viewing

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<sup>1</sup>Used for Bo Yu's presentation of *TPC Technical Design* at the *Detector Review* on August 4, 2010.

# Engineering Design from Bo Yu

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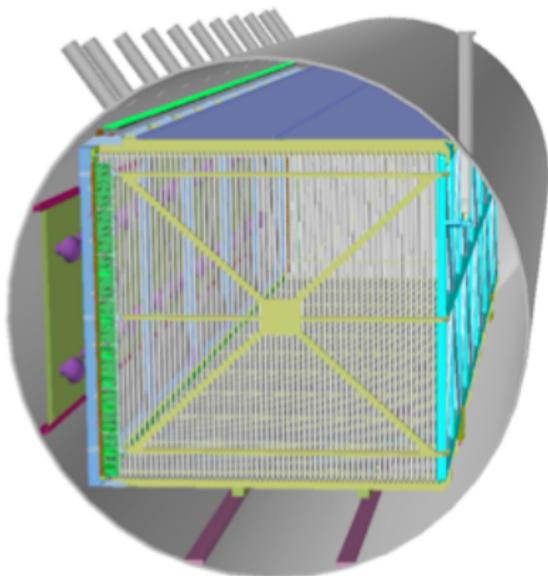
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# Priority of Detector Pieces

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High	Medium	Low
LAr	PMTs and rack	Building
Wire Planes	Motherboards	Earth
Field cage	Cryostat insulation	
Cryostat tube	Cryostat flanges	
Cathode plane	Electronics racks	
Ground Plane	Internal supports	
Materials	External supports	

# Internal Status

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Part	% Done	Status
Cryostat	50%	Tube defined
Field Cage	90%	Tubes, frame defined
Wire Planes	80%	Wires and frame defined
Cathode Plane	100%	Done
Top Ground Plane	100%	Done
PMTs and Rack	90%	All, but rack
Motherboards	90%	Shape defined
Supports	100%	Done

# Field Cage

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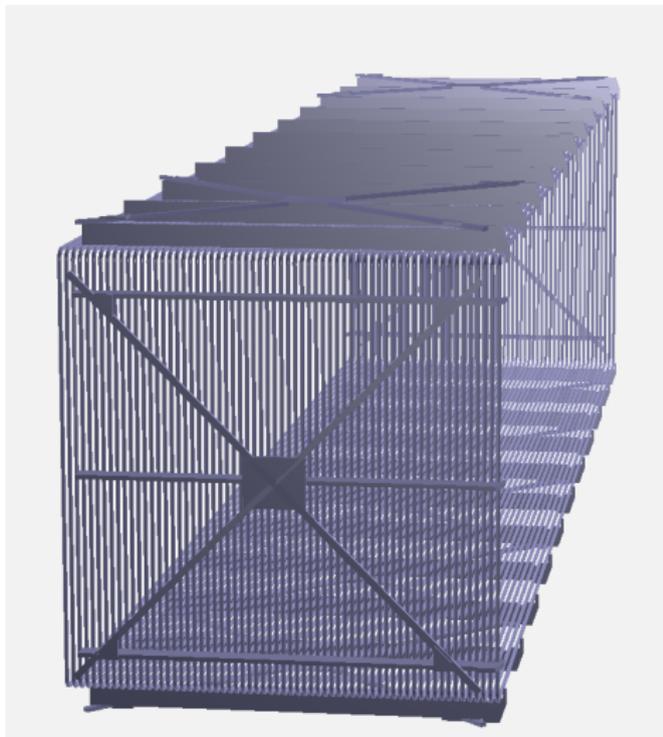
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# Top ground plane

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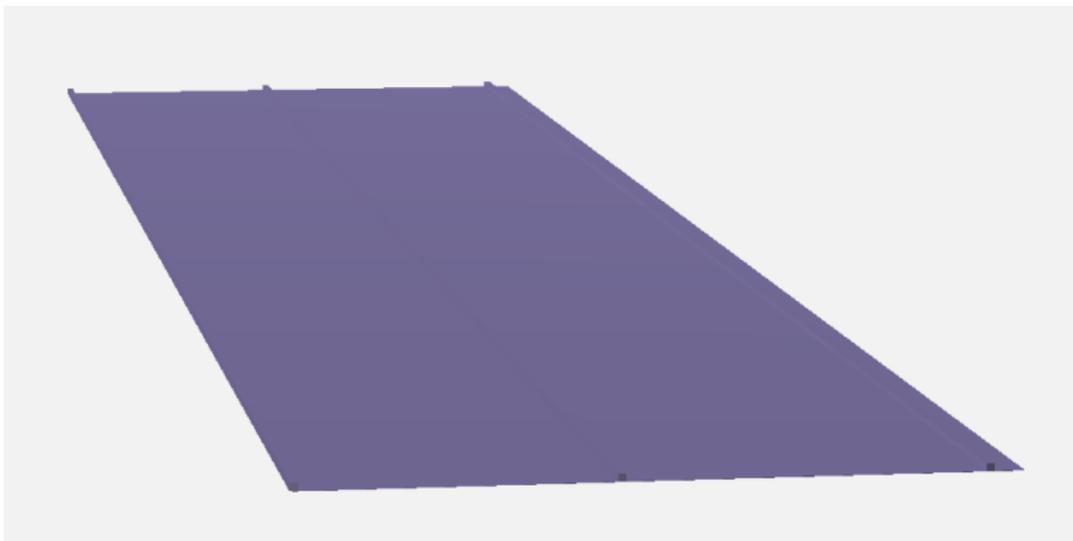
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# Cathode plane

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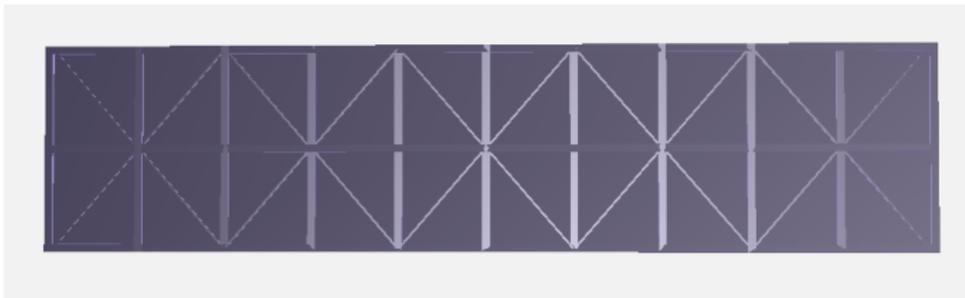
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# Wire plane

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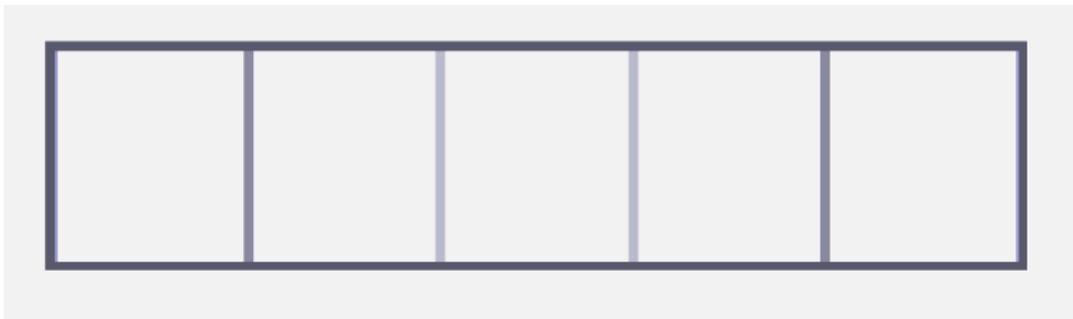
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# Motherboards

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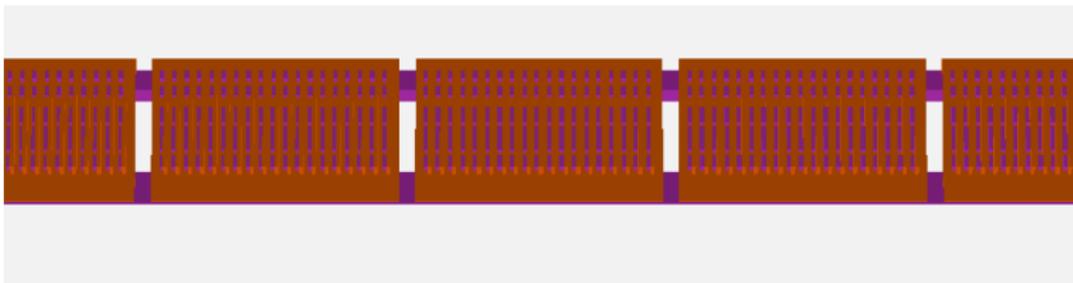
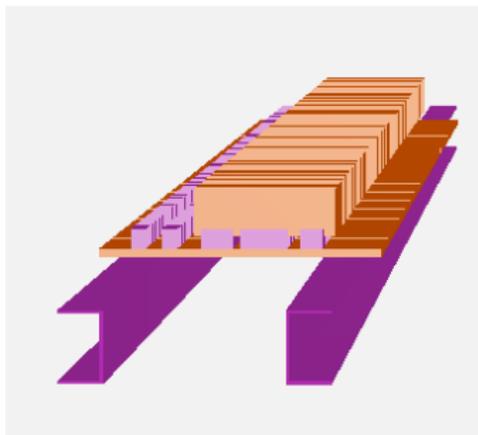
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# PMTs

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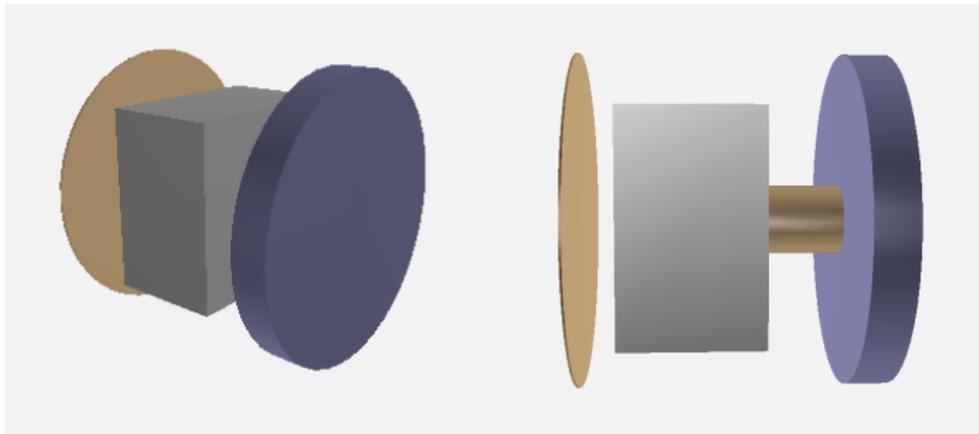
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# Internal supports

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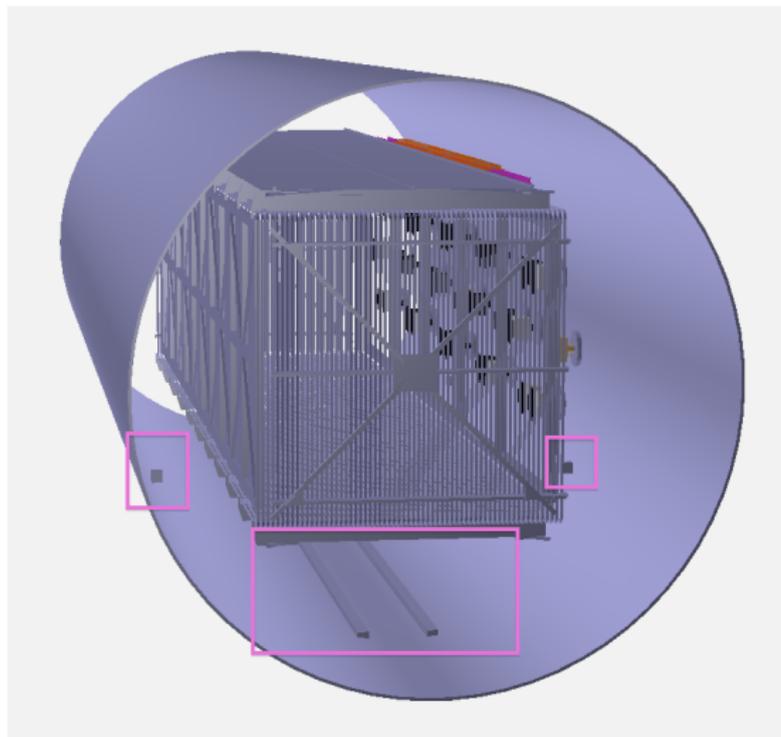
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# Cryostat Interior

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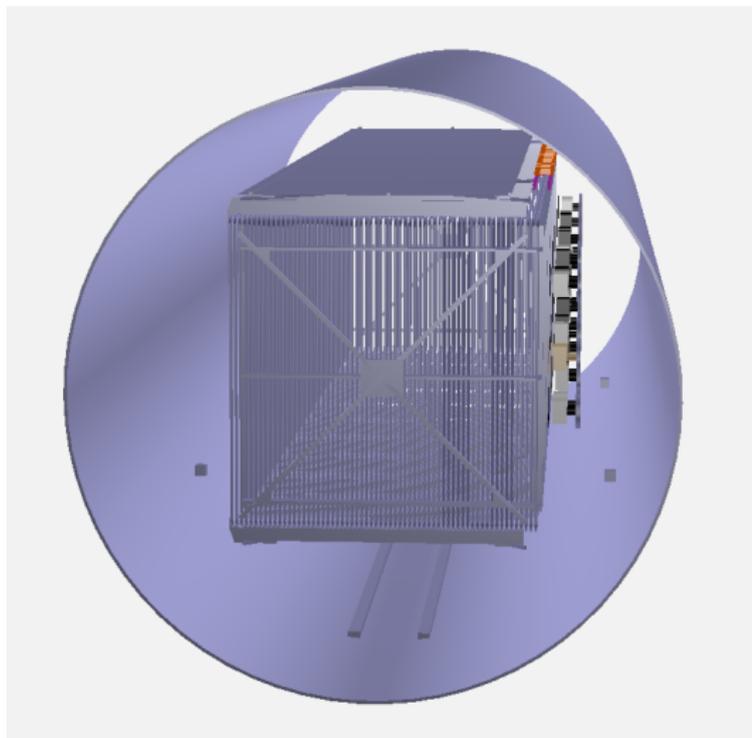
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# Cryostat Interior

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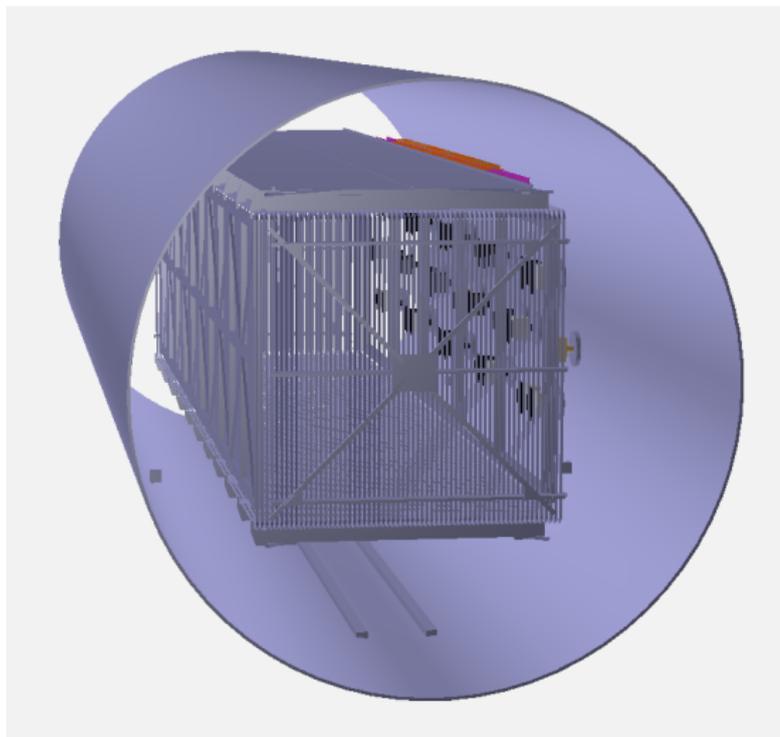
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# External status

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Part	% Done	Status
Cryostat Insulation	0%	—
Flanges	50 %	Tubes defined, not placed
Cryostat Support	0%	—
Electronics Racks	0%	—
Building	0%	Design unknown
Earth	0%	—

# Running Monte Carlo Jobs with GDML

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- Have not run first job with GDML yet
- Plan to finish most of interior and then test
- Eric Church and I will do trial run within next week

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- Most of detector interior completed
- Will begin working on as much of exterior as possible
- Until we know building, can't complete external geometry
- Will begin checking with Geant4 and GENIE soon