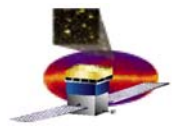


Status of Geometry in Gleam

- Short review of the geometry model
- Recent Progress
- Status of the subsystems
 - Tracker
 - Calorimeter
 - ACD
 - NAD (Not A Detector)
- Summary and Plan

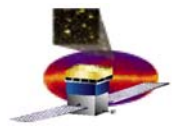
I'm reporting on the work of Joanne, Sasha and Heather, as well as my own.



Introduction to xmlGeoDBs

- **Primary constants**
 - material names
 - integer constants (counts)
 - floating point constants (dimensions, offsets)
- **Derived constants (mostly offsets)**
 - From primary constants using xml arithmetic
- **Construction of volumes**
 - Dimensions and offsets are all primary or derived constants
 - No hardwired numbers! (except for "2", and "90")
- Identifiers - not of interest here

*For a nice description see: [GLAST software page](#) -> [Software Cantons](#)
-> [Geometry](#) -> [Writing XML Files for GLAST](#)*



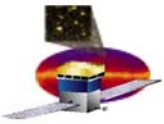
Description of LAT and Subsystems

The overall description of the LAT can be found in:

- [xmlGeoDbs/xml/flight/flightSegVols.xml](#)

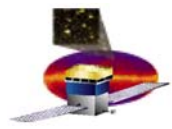
Subsystem volumes are defined in:

- [xmlGeoDbs/xml/flight/flightTKROneTkr.xml](#)
- [xmlGeoDbs/xml/flight/flightCALOneCal\(SegVols\).xml](#)
- [xmlGeoDbs/xml/flight/flightACDAcd.xml](#)
- [xmlGeoDbs/xml/flight/flightNADGeo.xml](#)



Building the geometry

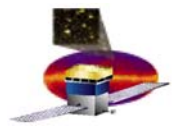
- Define primitive (uniform material, simple shape) volumes
 - Boxes
 - Cylinders
- Assemble into **stacks** along an axis *or*
- Position individually in a **composition** volume.
- Compositions always have an explicit envelope volume; stacks never do.
- May have arbitrary levels of nesting.
- Dimensions and offsets appearing in the source volume descriptions are *always* referred to by name as previously-defined primary or derived constants.



Example Volume: Tracker Closeout Side

Primitive volume (**box**). Has a name, material and dimensions. May also be marked as sensitive.

```
<box name="TKRCloseoutRegLong"  
  XREF="TKRCloseoutLen"  
  YREF="TKRCloseoutWidth"  
  ZREF="TKRCloseoutThick"  
  materialREF="TKRCloseoutMat"  
>
```

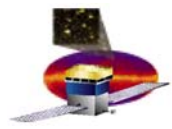


Example Volume: Tracker Tray

Stack along z-axis. Since components are immediately adjacent and are all centered in transverse dimensions, no offsets are required.

```
<stackZ name="trayBot" >
  <axisPos volume="TKRFaceMin" >
    <idField name="fTKRTrayCmp" valueREF="eTKRBotFace" />
  </axisPos>
  <axisPos volume="TKRCoreOuterBottom" >
    <idField name="fTKRTrayCmp" valueREF="eTKRCoreClose" />
  </axisPos>
  <axisPos volume="TKRTopFaceReg" >
    <idField name="fTKRTrayCmp" valueREF="eTKRTopFace" />
  </axisPos>
  <axisPos volume="SiLayerYMeas" >
    <idField name="fTKRTrayCmp" valueREF="eTKRSiTop" />
  </axisPos>
</stackZ>
```

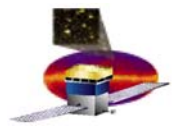
Note: xml doesn't know height of stack after it's done making it...



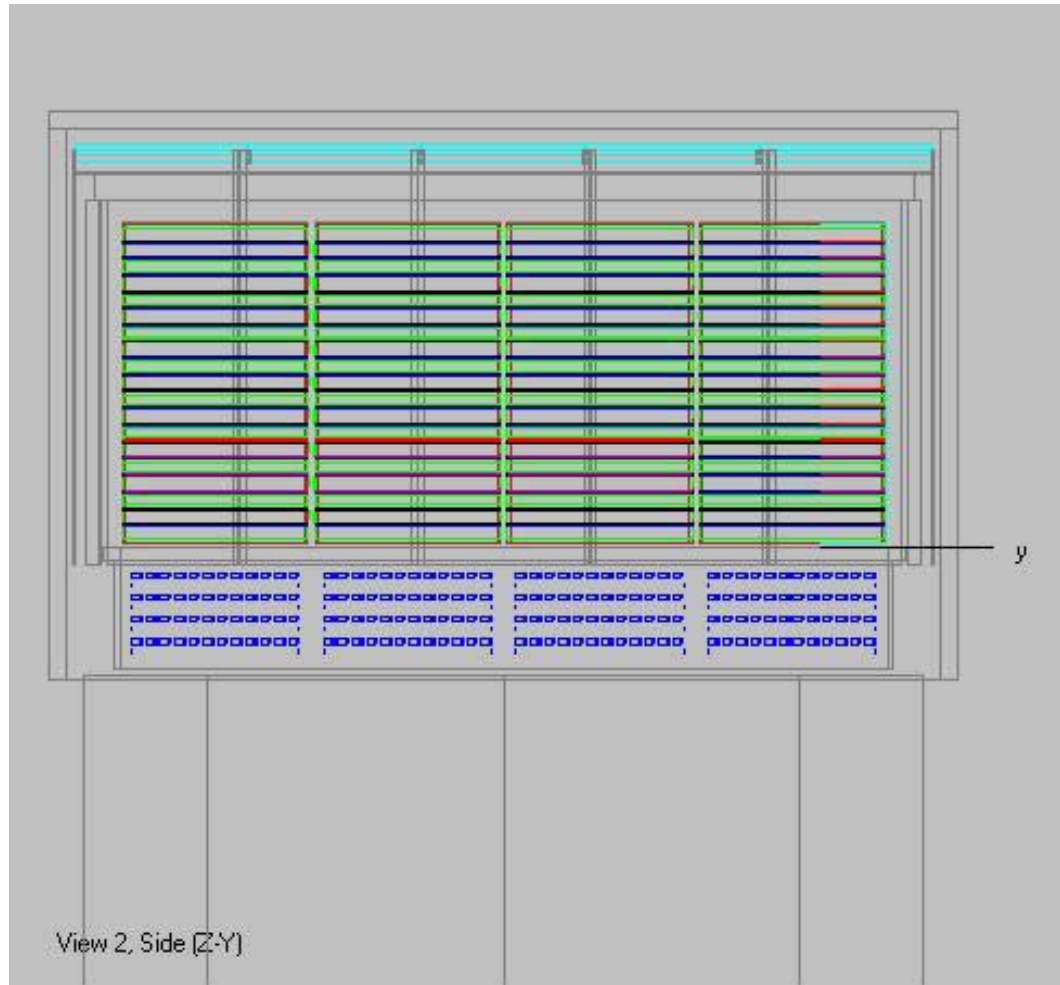
Example Volume: Closeout Assembly

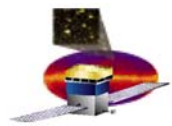
Composition of Tracker core+closeout+MCM boards. (Core is centered, needs no offsets.)

```
<composition name="TKRCoreReg" envelope="TKRCoreRegEnv">
  <posXYZ volume="TKRCoreRegBox">
    <idField name="fBorderCmp" value="eCenter" />
  </posXYZ>
  <posXYZ volume="TKRCloseoutRegLong" YREF="TKRCloseout_dt">
    <idField name="fBorderCmp" value="eTop" />
  </posXYZ>
  <posXYZ volume="TKRCloseoutRegLong" YREF="TKRCloseout_dtn">
    <idField name="fBorderCmp" valueREF="eBottom" />
  .... (more closeout pieces go here)
  <posXYZ volume="TKRMCM" YREF="TKRMCM_dtn" ZREF="TKRMCMint_dzn" >
    <idField name="fBorderCmp" valueREF="eFarBottom" />
  </posXYZ>
  <posXYZ volume="TKRMCM" YREF="TKRMCM_dt" ZREF="TKRMCMint_dz">
    <idField name="fBorderCmp" valueREF="eFarTop" />
  </posXYZ>
</composition>
```

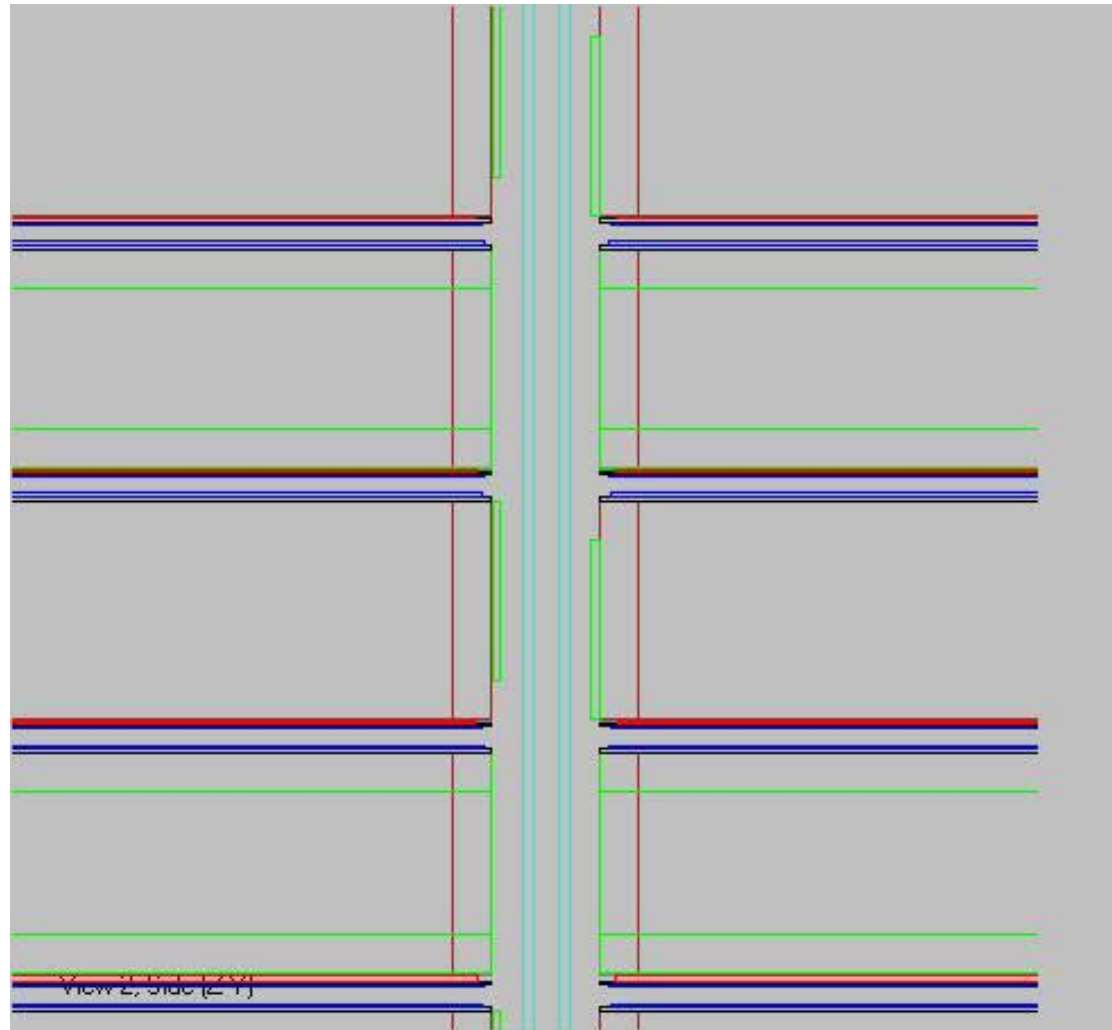


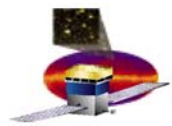
Overview of Tracker



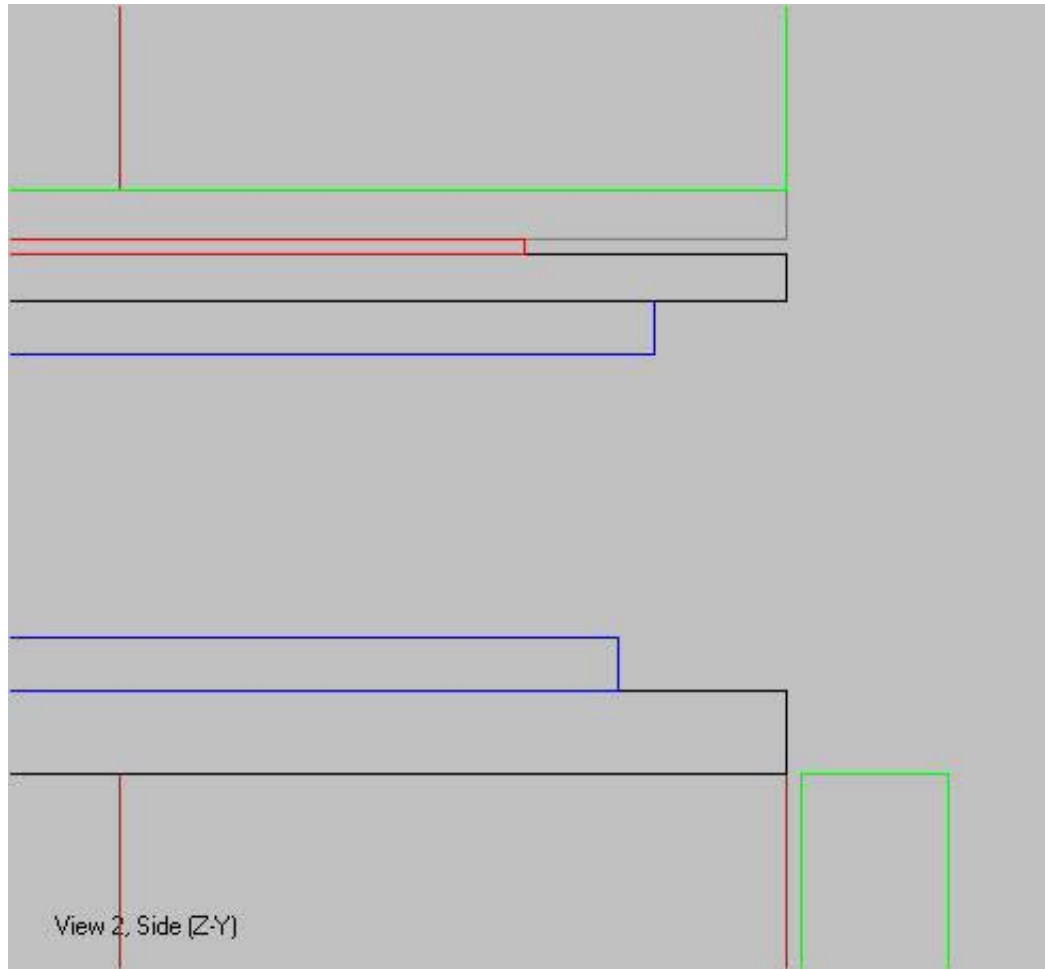


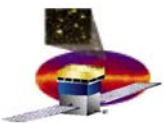
Zoom In





More Zoom





Recent Progress

In preparation for DC1, we've conducted reviews of the Glean geometry for the tracker and calorimeter. ACD will follow. See:

http://www-glast.slac.stanford.edu/software/CAL/GeometryReview_agenda.htm

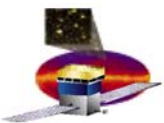
and

http://www-glast.slac.stanford.edu/software/TKR/TKRGeometryReview_agenda.htm

The purpose of the reviews was to refocus attention on the geometry:

- to review and verify the implementation
- to catch up with design changes since the last iteration
- to look for places where the model can be improved
- to improve the way the design (and design changes) are communicated to the software developers.

Many of necessary changes have already been implemented.



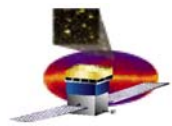
Updates to Tracker Geometry

Bugs Fixed

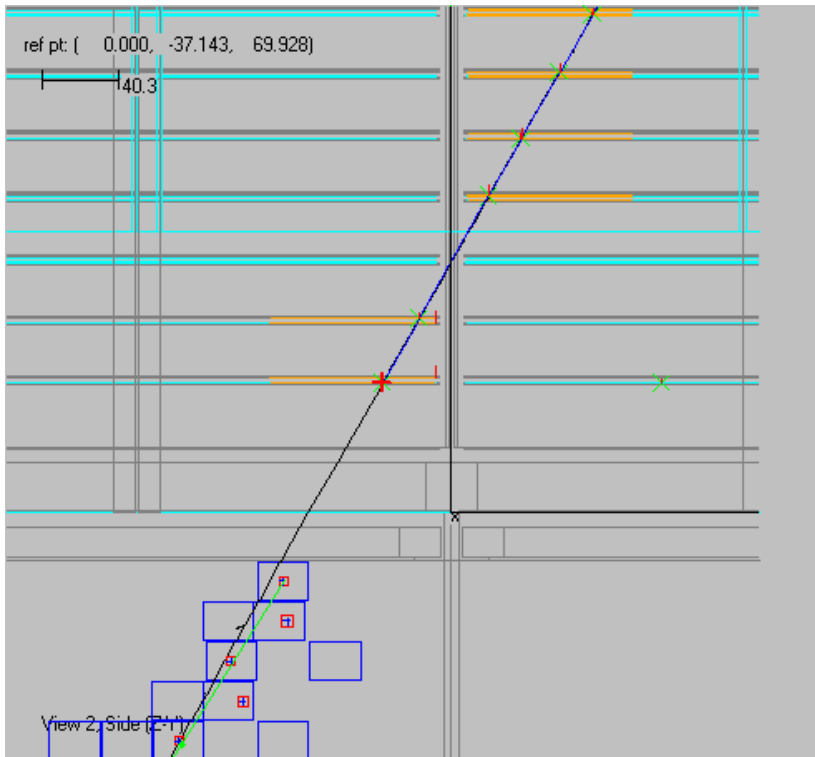
- **Z=0** was at bottom of grid, rather than at top
 - Would make no difference if code were translationally invariant
 - But it did! After removing lots of hard-wired constants, seems to be better...
 - Standard test almost ready
- **Wrong converter**
 - SuperGlast converter was changed from pure W to W alloy
 - Thickness was increased to get back to 18% r.l.
 - Model had a thicker pure tungsten converter
- **Offset**
 - Tracker was centered in stay-clear, instead of sitting on grid

Design changes

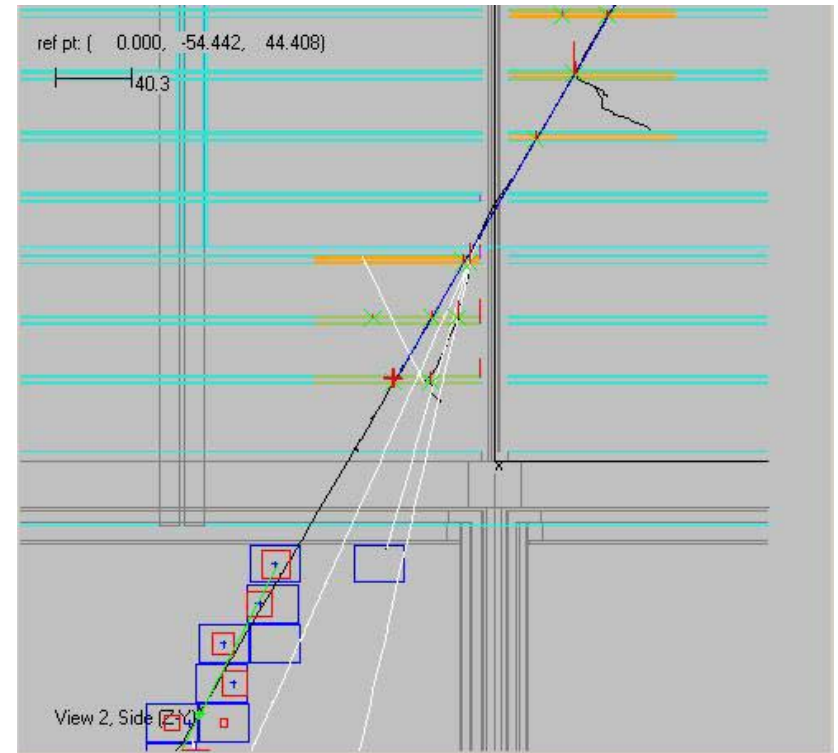
- **Bottom tray reworked**
 - Dimensions (thicker face plates, thicker overall)
 - Materials (light core changed to heavy)



Before and After



Previous



New



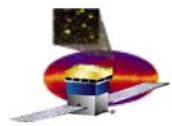
Summary of “Active” Radiation Lengths

- **W Converter** 1.0850 ✓
- **Silicon** 0.1584 ✓
- **Core** 0.0563 ✓

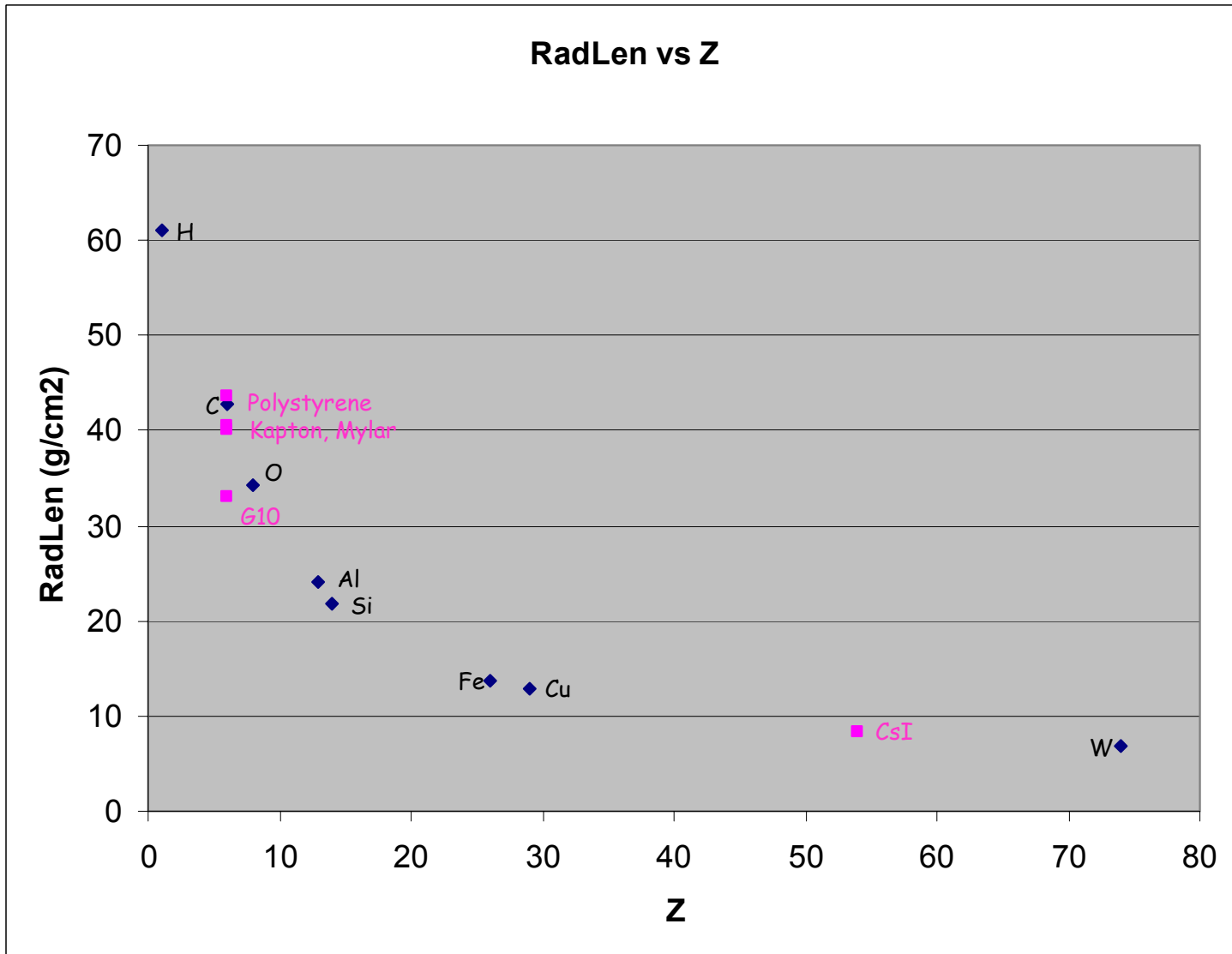
- **BotFace** 0.0258
- **TopFace** 0.0453
- **BotBias** 0.0250

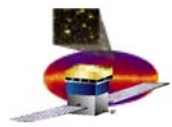
- **Total** 1.3958

- Top 3 items are simple elements; 93% of r.l. so “Nothing can go wrong!”
- Remaining 3 are composites; mostly ~carbon, with some Si, Cu, etc.



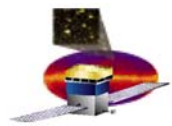
Radiation Lengths for some common Materials





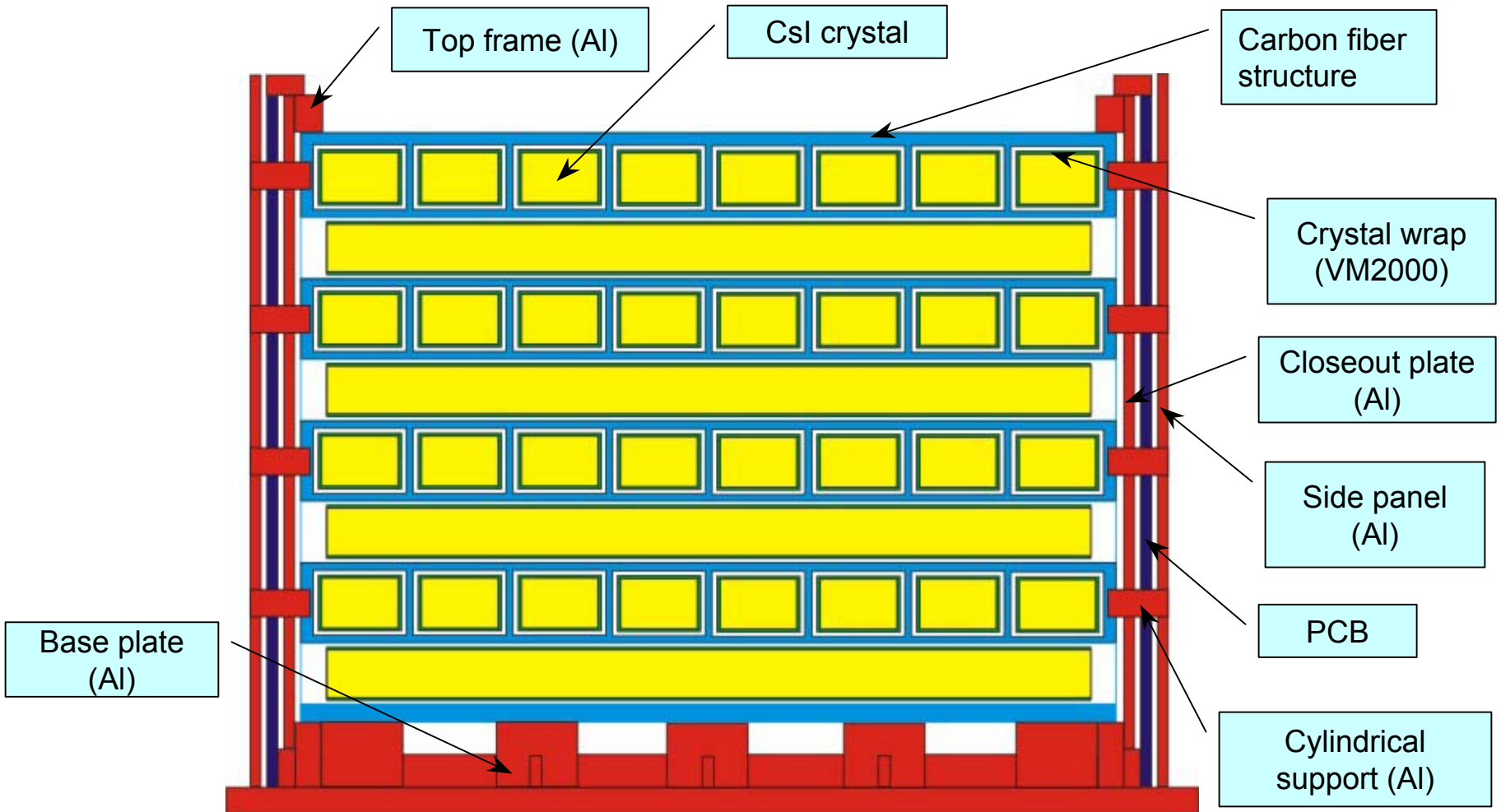
Passive Tracker - To Do

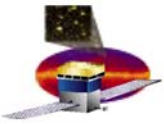
- **Walls:** includes carbon fiber, bolts
 - needs Al coating
- **MCM:** mass calculation based on BTEM module
 - Should be redone, when we get better info
- **Closeout**
 - Complicated shape; dimensions and effective density should be reviewed.
- **Top/Bottom tray**
 - More accurate model of frame, especially bottom
- **Other material not in model**
 - Cables -Heat straps
 - Flexures -???
- **Reality check:** compare weight of tracker in *Geometry* with design



CAL geometry overview

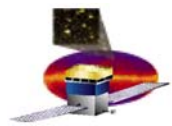
(not to scale - only 8 crystals per layer shown)



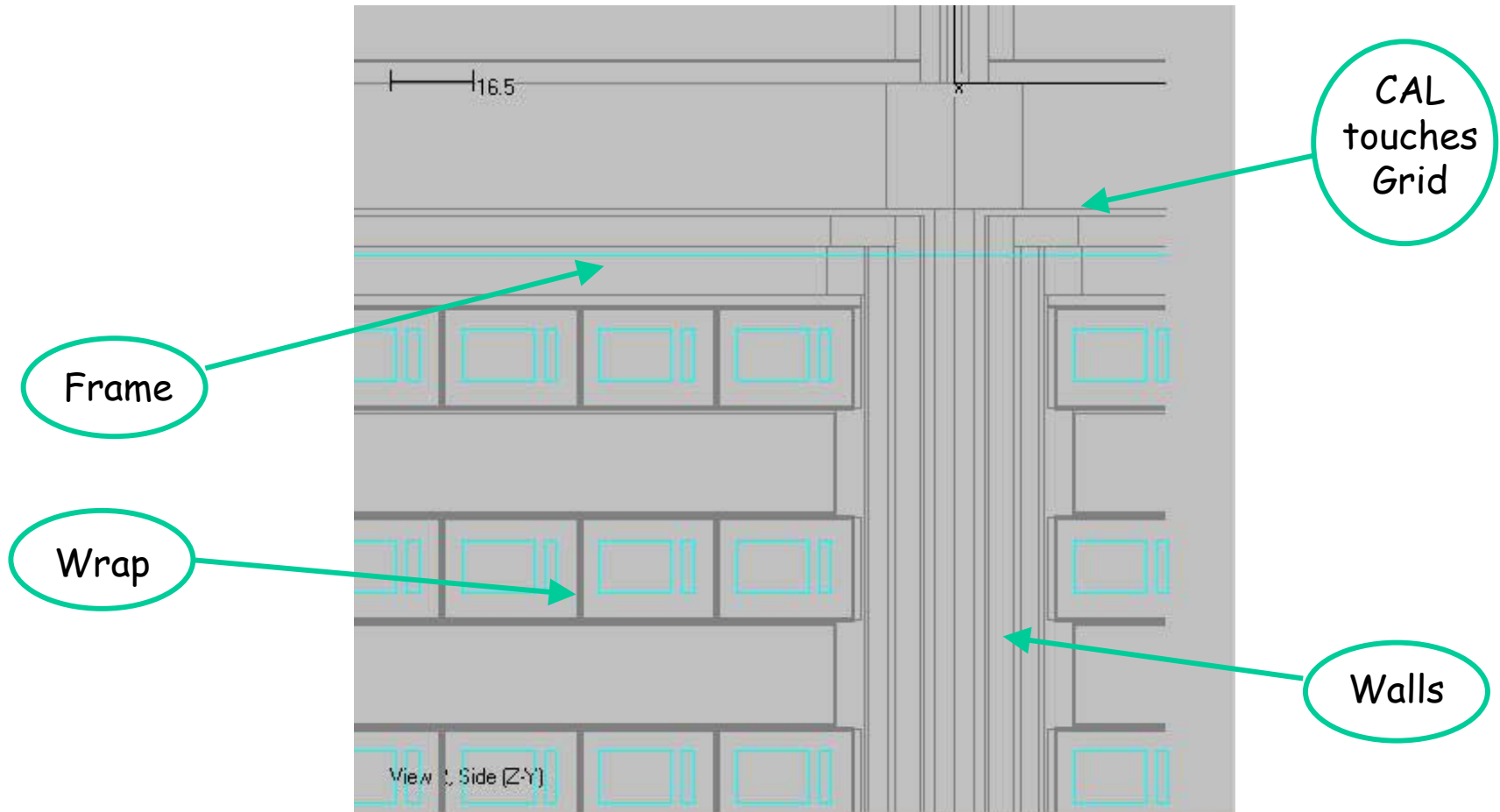


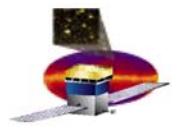
Changes to Gleam Geometry

- Done
 - Position CAL against bottom of grid
 - Shorten CsI crystals, as per new design (sigh!)
 - Add individual crystal wraps (placeholder material)
 - Refine model of top frame
 - Add sidewalls (placeholder material)
 - Will probably change crack corrections for ~normal particles
- To Do
 - Add detailed base
 - Add cylindrical supports



CAL Geometry Updates



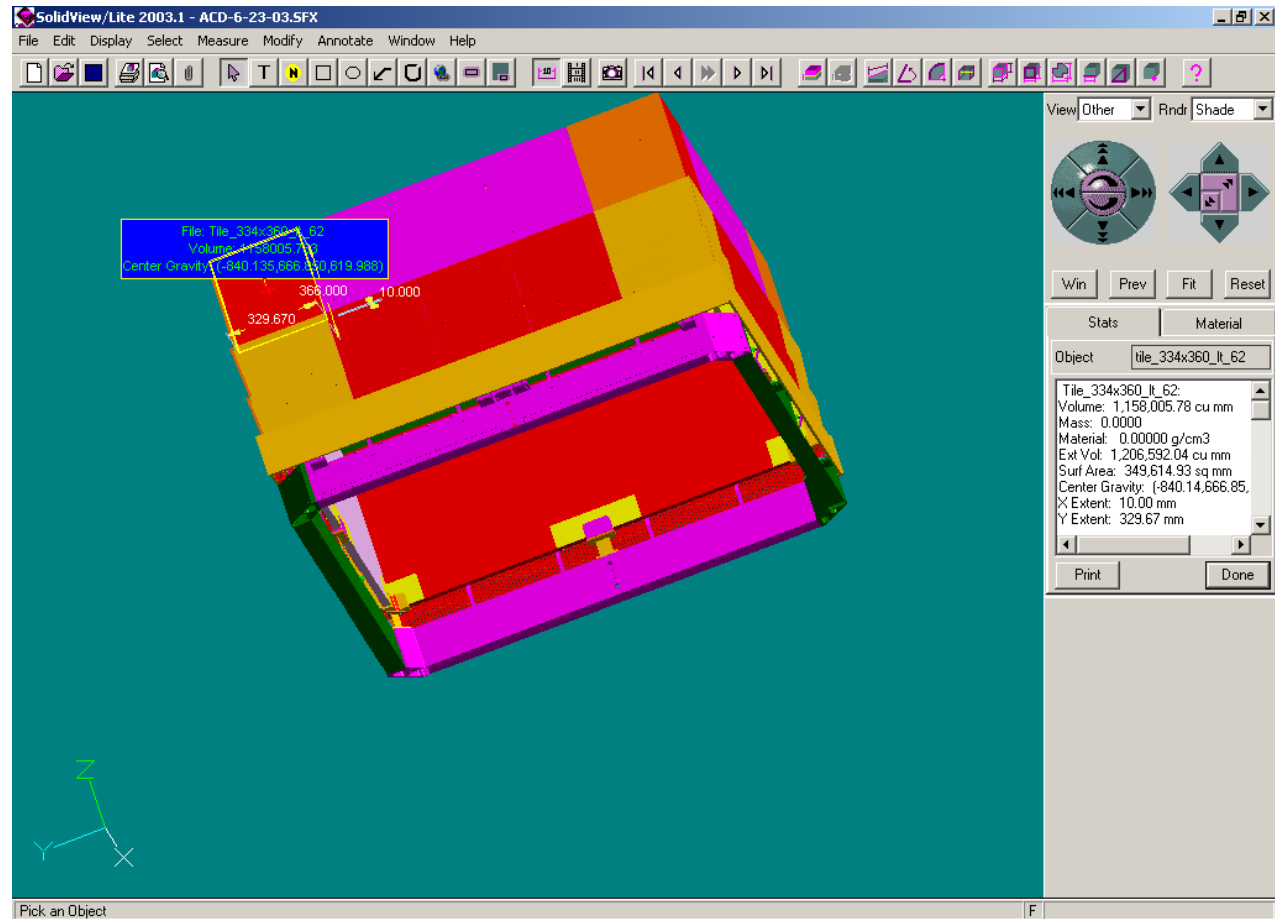


The ACD model and SolidView

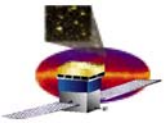
The whole ACD geometry is available in sfx files viewable using SolidView.

SolidView allows interaction with a 3D model.

SolidView provides an easy mechanism to obtain all of the details concerning the ACD geometry



<http://www.solidview.com>



Updating the ACD Geometry

(Lots of little pieces!)

First pass - in progress

Update tile and ribbons/fibers dimensions

Update tile shell assembly (TSA) support structure dimensions and materials

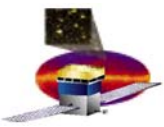
Add Base Electronic Assembly (BEA) support structure

Second pass - late August

Account for mass in fiber cables mounted on the TSA

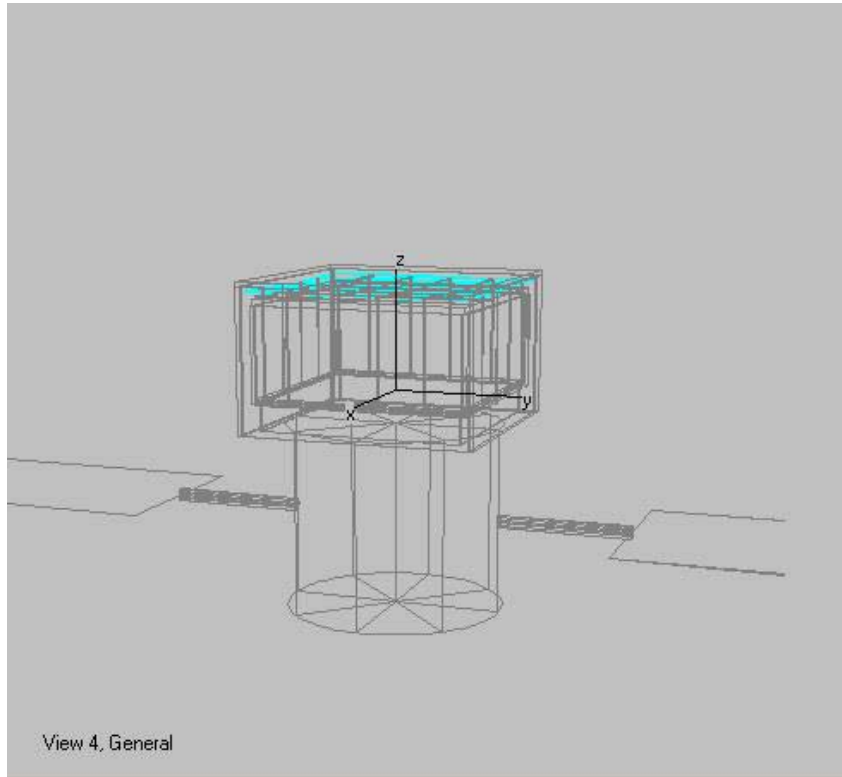
Update thermal blanket

Account for mass in the fully populated BEA and electronics chassis assembly.

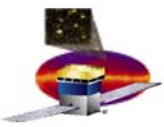


N (ot) A D(etector)

Everything else... This “subsystem” has become a bit of an orphan. Its geometry description is currently fairly crude.



We hope to remedy this soon.



Status and Plan: Summary

- A number of bugs have been found and fixed in the geometry description, design changes have been applied, and some elements have been refined. The changes are being made roughly in the order of importance.
- We expect all the remaining changes to be made by the end of August, based on communications with the relevant people, scrutiny of the relevant documents, etc.
- Rich Bielawski of Systems Engineering will be compiling a document capturing the numbers (dimensions and materials) in xmlGeoDBs, with a trace to where they came from. This will include the spacecraft. The subsystem managers will then sign off on these numbers. This should also be done by some time in August.