

# TRT Material Status

Fred Luehring

Hampton TRT Workshop Simulation Session

May 21, 2002

# Recent Work on Material

- The barrel service calculation has had the Faraday cage material added to it.
- A detailed calculation of the services at the outside of the end-cap has been started but work continues on:
  - The electronics cooling system.
  - The manifolds.
  - Structural elements attached to the wheels.
  - The CO<sub>2</sub> ventilation system.
- The mass on the barrel material spread sheets has been compared to the mass calculated by Andrea.
- As was said in the simulation talk, it was discovered that the comparison method to the simulation needs to be revised.

# Barrel Material

- The only change in the material of the active region is to add the Faraday cage to the support cylinders:
  - Al layers of 0.34% X0 at both  $R = \sim 56$  cm and  $\sim 107$  cm.
- The material for the services at the end of the barrel has increased from 13.8% X0 to 15.0% X0.
  - Increase is mostly from including the Faraday cage.
  - Small increase from better estimates of adhesives.
  - Small decrease from changes to one kind of connector.
- The biggest uncertainties are:
  - The mechanical structure of the electronics.
    - Currently using chip on board.
    - Will change to FBGA?
  - The electronics cooling.

# Barrel Mass

- Andrea and I compared our masses for the barrel:

Item	Andrea	Fred
Space Frame and Cylinders	87	91
Faraday Cages	10	18
Space Frame Hardware	0	2
Outer Rails	12	12
Type 1 Modules	102	102
Type 2 Modules	160	160
Type 3 Modules	234	234
Total	605	619
Difference	-14	

Masses  
in kg.

Reasonable agreement found!

# End-Cap Material

- There are no changes to the spread sheet for the inner ring services:
  - The masses that Andrea gave me for the inner rings will slightly reduce the amount of material
  - Currently 2.98% X0 A, 2.10% X0 B, and 2.98% X0 C.
- The active region has not been changed on my spread sheets but:
  - The simulation has been revised to have a better representation of the radiators.
- Both the simulation and my spread sheets are missing the heat exchangers for the ventilation gas and the membranes sealing the front and back of the wheels.

# End-Cap Material (continued)

- The detailed calculation of the outer ring region is 75% done for the type A wheels:
  - The intermediate result is ~15% X0 with some portions of the material not included.
  - Previously had 11.78% X0 type A, 9.76% X0 type B, and 10.80% X0 type C.
- I believe that I have identified most of the items that need to be included.
- I have not yet looked at the cables and other items running outside the end-cap wheels but I believe that Claude Menot has a calculation of them.

# Conclusions and Future Plans

- Thanks go to Andrea C., Mar, Jan, and Rick for supplying lots of useful information.
- In the near term, I expect to:
  - Check the inner ring and active regions of end-cap.
  - Add the AI ventilation gas heat exchanger.
  - Finish the detailed calculation of the end-cap outer services.
  - Check the revised mass of the squirrel cage.
  - Double check the electronics assuming a FBGA design.
- Then the simulation will be revised with the new material amounts and elemental distributions.
  - I will recheck the mass of the detector using the simulation once the volumes are simulated with reasonable elemental distributions.