

# Anti-Coincidence Detector

Tile Detector Assembly (TDA)  
to

Tile Shell Assembly (TSA)  
Mounting Issues –

Report to SLAC on Nov. 18, 2003

By

Ken Segal

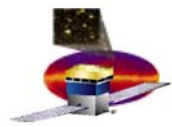
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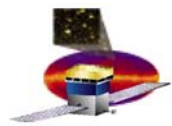




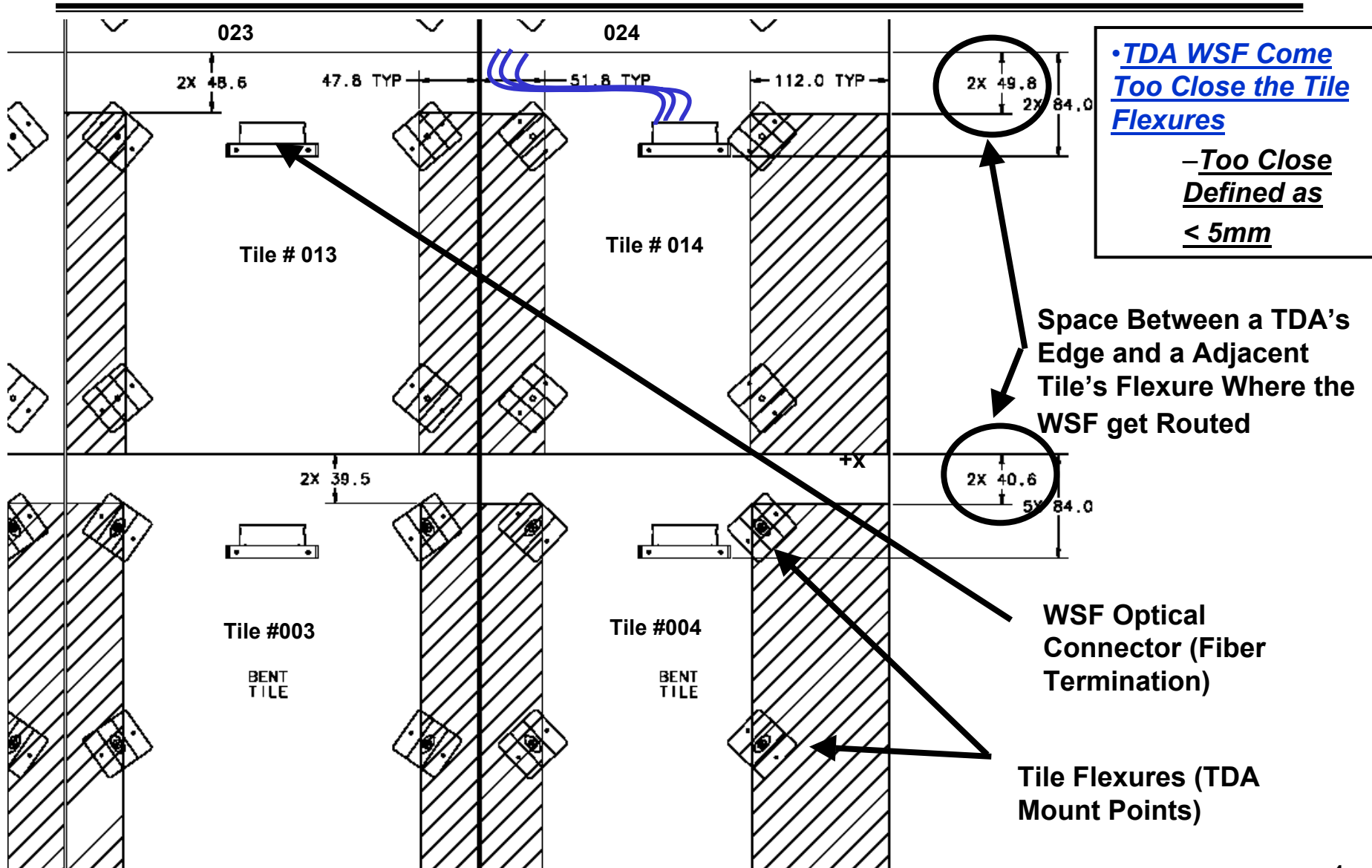
# TDA / TSA Mount Issues - Today's Presentation

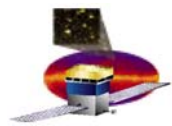
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- **Look at Details of the TDA to TSA Spacing and Interference Issues**
  - **Illustrate Specific Problem Areas**
  - **Define Solutions Addressing the Problem Areas**
  - **Report Solution Implementation Status**

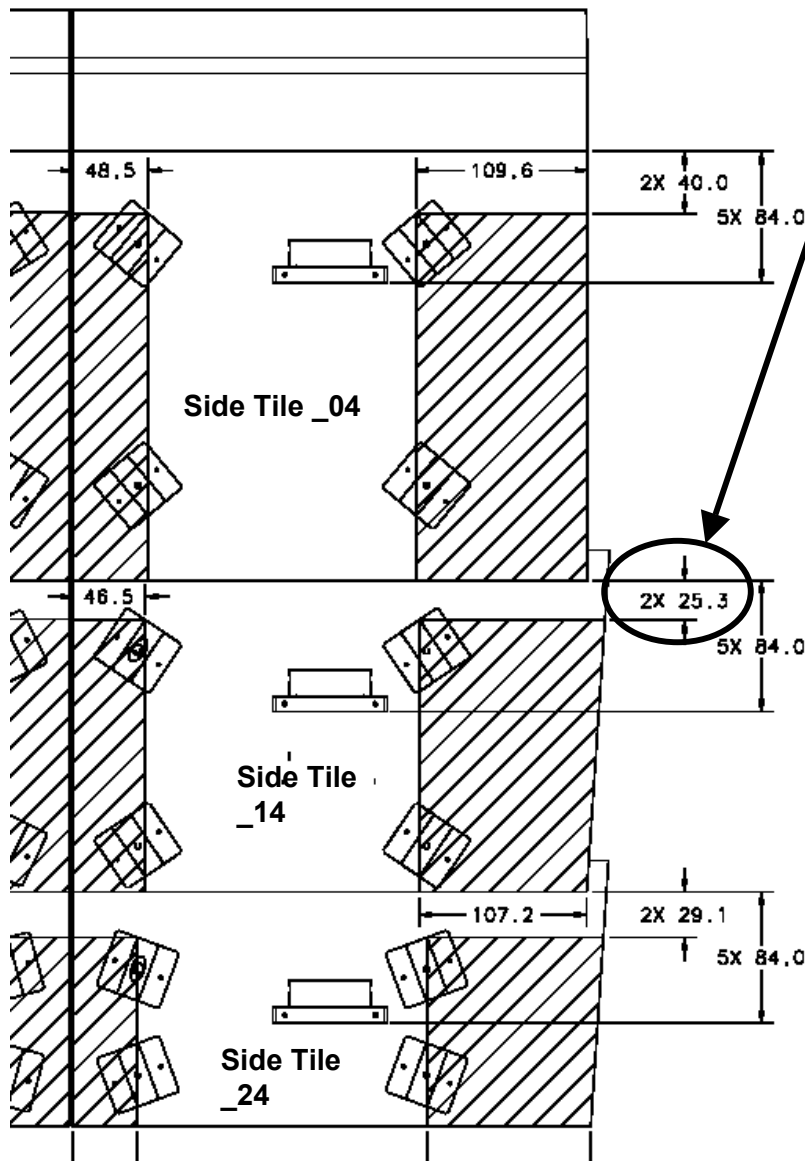


# Tile Spacing Issue Defined (Top Tiles Shown)





# Tile Spacing Issue – Worst Care

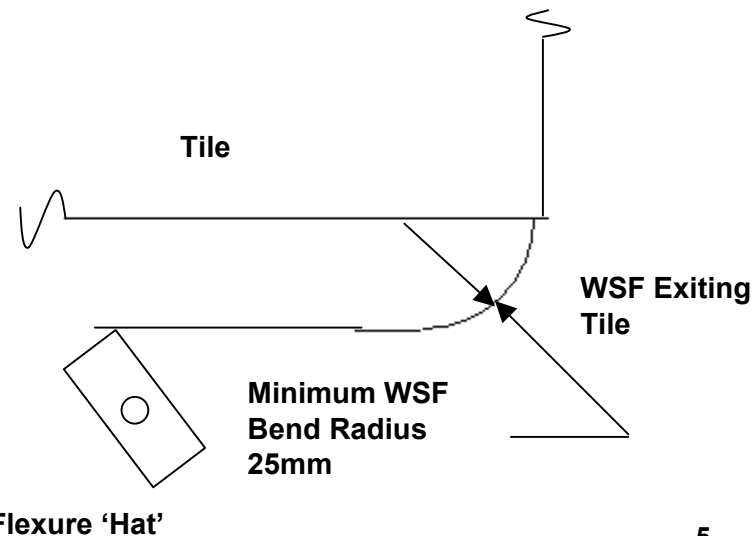


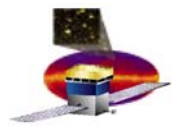
## **BIGGEST CHALLENGE**

•Spacing Between Crown Tile (Row 1) and Row 2 Tile Flexure (Upper) :

•25mm WSF Bend Radius Spacing was the Design at the Time Issue Was Found

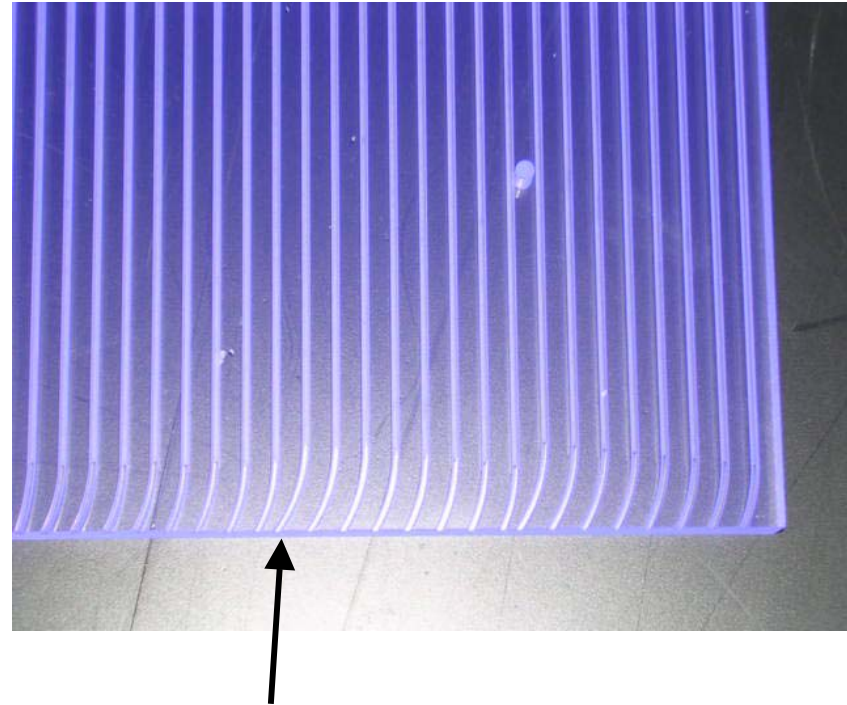
•Brings the WSF too Close to Tile Flexures.



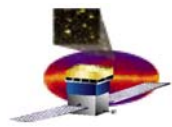


# Tile Spacing Issue Solution

- TDA to TSA MOUNT SPACING
  - *Solutions Implemented*
    - ✓ Establish Design Envelope Between TDAs and TSA Mounts.
      - ✓ Worked With FERMI to Establish Acceptable TDA Envelope
        - ✓ FERMI Changed How the Fibers Exit the Tile
    - ✓ Moved Upper TSA Flexure Mounts 5mm for Row 3 TDAs
      - ✓ Tile Edge to Tile Flexure is Now 30.3mm

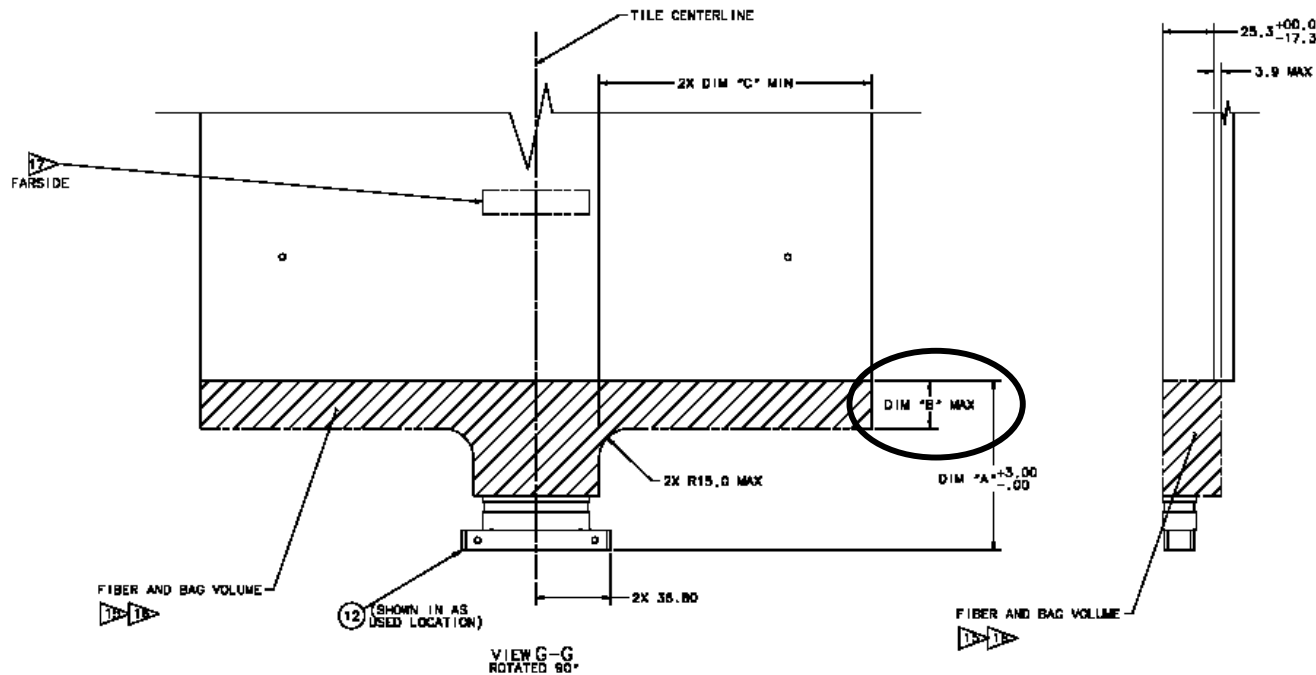


Instead of WSFs Exiting Straight Out Tile Edge (Prior Design), a Groove in the Tile Initiates the WSF Curve 20mm Sooner.



# TDA Envelope Drawing

THIS IS SHEET 7 OF EO GD2054511 REV -  
ADD SHEET, TABLE1 AND VIEWS AS FOLLOWS:



- Revised TDA Drawings to Define TDA / WSF Envelope

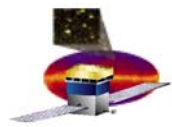
- Conforms the Numbers (Dim B) FERMI Demonstrated and Agreed with.

- TDAs Inspected Prior to Delivery.

## Current Design:

- Smallest Tile to WSF Envelope (X-Hatch) Dim 'B' is now 23.7mm (MAX)
- Smallest Tile Edge to Tile Flexure is now 29.1mm
- Minimum of 5.6mm Clearance is now Achieved.

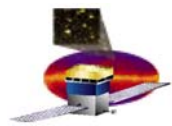




# Tile Spacing Issue - Implementation Status

<b>TDA to TSA MOUNT SPACING IMPLEMENTATION STATUS</b>		
<b>Design</b>	<b>Comments</b>	<b>Status</b>
2054496	Bent Tile Drawing	No Change Required
2054497	Flat Tile Drawing	EO - Released
2054498	Crown Tile Drawing	EO - Out for Signature
2054499	Right Diagonal Tile Drawing	EO - Out for Signature
2054501	Left Diagonal Tile Drawing	EO - Out for Signature
2054510	Bent TDA Drawing	EO - Released
2054511	Flat TDA Drawing	EO - Released
2054583	Right Diagonal TDA Drawing, Row 2	Planned Completion 11-19
2054611	Left Diagonal TDA Drawing, Row 2	Planned Completion 11-19
2054636	Side Panel Drawing	EO - Out for Signature
<b>Analyses</b>		
Tile Frequency	Flexures Changes Affects Tile Frequency and Deformations	DONE: Negligible Frequency Change. Deformation Grows by .02mm (within Allowable Tile Gap)



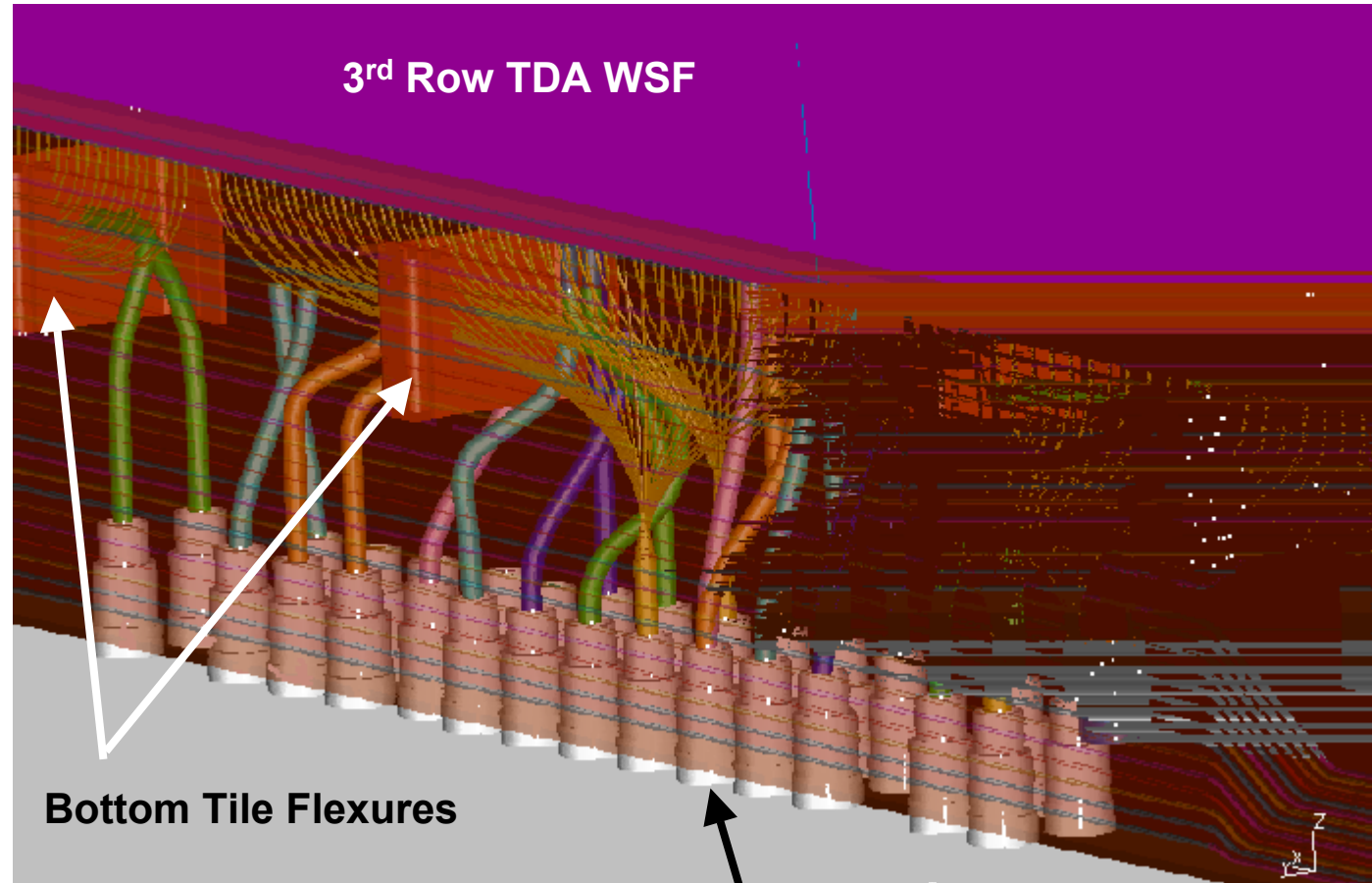


# 3<sup>rd</sup> Row TDA WSF to Bottom Tile Flexure Interference

## PROBLEM

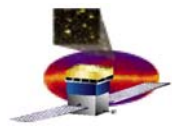
- The Bronze Colored WSF Interfere with the Bottom Tile Flexures Shown

- Note: The WSF terminate directly into the PMTs



Bottom Tile Flexures

Clear Fiber Cable  
and WSF  
Terminations

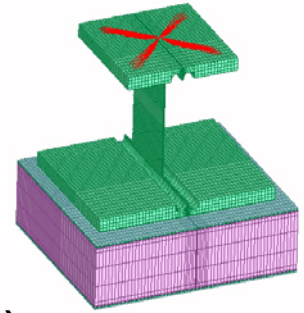


# 3<sup>rd</sup> Row TDA WSF to Bottom TSA Flexure Interference

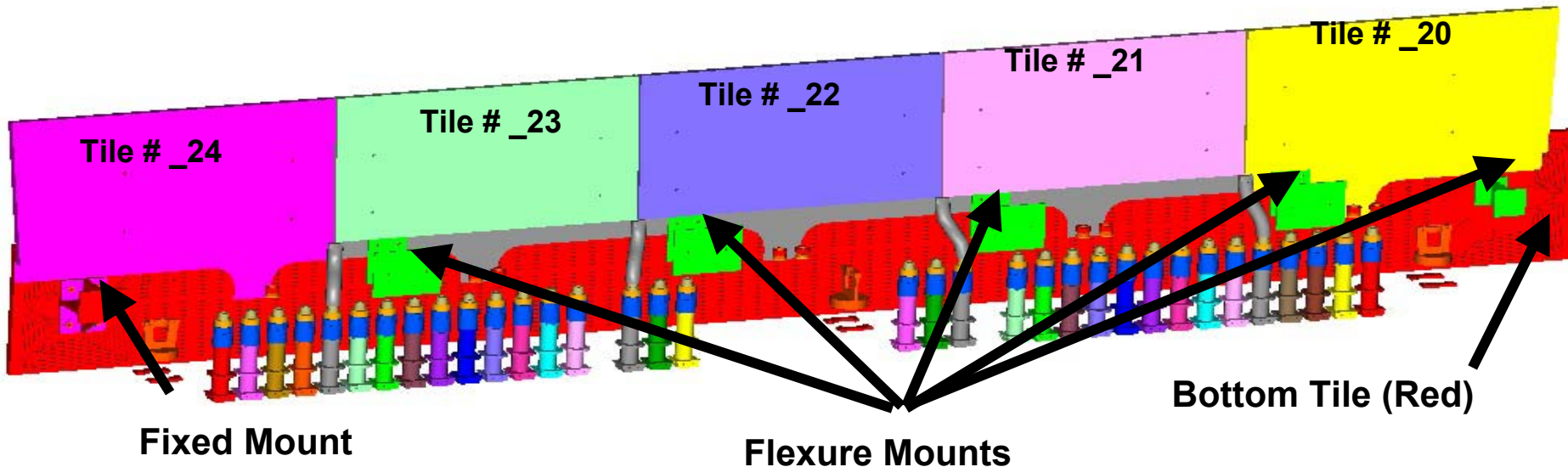
## 3<sup>rd</sup> ROW TDA WSF to BOTTOM TILE FLEXURE INTERFERENCE

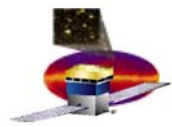
### – Solutions Implemented

- Designed a Titanium Blade Flexure
  - Requires Less Space Than Prior Design's Hat Section
- Relocated New Flexures to Less Obtrusive Areas
  - Kept Close to Tile Ends
  - Used Less Flexures (Frequency Goes Down, Deformations Up)



Looking From Inside ACD Box Out





# 3<sup>rd</sup> Row TDA WSF to Bottom TSA Flexure Interference

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## 3<sup>rd</sup> ROW TDA WSF to BOTTOM TILE FLEXURE INTERFERENCE

### – Solutions Being Implemented

#### • *Design*

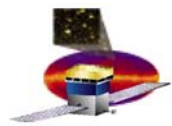
- Defining TDA to TSA Envelop Drawings for Tiles #\_20 thru \_24
- Update Ribbon Detectors in the ACD Model

#### • *Updating ACD Mockup*

- Physical Model Will Be Used to Derive Final TDA Design Drawings
  - » Bottom Tile Area Hard To Model Well.
  - » Very Busy Area with 194 PMTs and Optical Cable Terminations

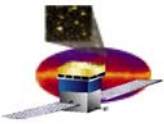
#### • *Analyses*

- Assess Bottom Tile with Reduced # of Mounts
  - Ensure Bottom Tile Gaps to Other Tiles and to PMTs are Sufficient
  - Frequency is at 54Hz (ACD is at 53Hz)
  - Being Reviewed for Potential Dynamic Coupling.



# Bottom Tile Interference Issue - Implementation Status

<b>3rd Row TDA to Bottom Tile Flexure Interference Implementation Status</b>		
<b>Design</b>	<b>Comments</b>	<b>Status</b>
2054623	Rt Diagonal TDA Drawing Row 3	Planned Completion 12-5
2054622	Left Diagonal TDA Drawing, Row 3	Planned Completion 12-5
2054620	TDA Drawing, Row 3 Middle Tiles	Planned Completion 12-5
2054680	Bottom Tile TDA	Planned Completion 12-12
2054682	Bottom Tile	Planned Completion 12-12
2054633	Bottom Tile Fixed Mount	Planned Completion 11-25
2054635	Bottom Tile Flexure	Planned Completion 11-25
Mockup	Updates being Incorporated	Planned Completion 12-5
Ribbon Update	Reroute Ribbons with Updated Information	Completed
<b>Analyses</b>		
Tile Frequency	Need to Assess if Dynamic Coupling Exists with Tile Freq. @ 53Hz	In Progress, Planned Completion 11/21
Flexure	Checked for Strength, Deflection and Buckling.	Analyses Completed, Margins all >.20



# SUMMARY

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- **ACD Team is Addressing Two Design Areas That Affect the Mechanical and Detector Areas:**
  - **TDA to TSA Spacing Issue is Resolved**
    - Final Design Changes are Being Released
  - **3rd Row TDA WSF to Bottom Row Tile Flexure Interference Solution is Established**
    - Design and Analyses Efforts are Being Worked with Completion Planned for 12-12