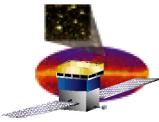


GLAST Large Area Telescope:

AntiCoincidence Detector (ACD) Overview WBS 4.1.6

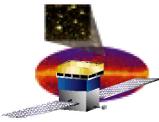
David J. Thompson
NASA Goddard Space Flight Center
ACD Subsystem Manager

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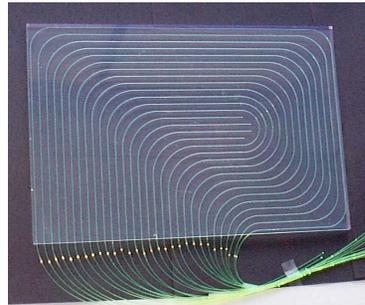
Outline - ACD

- **Overview**
- **Level III Requirements Summary**
- **Heritage**
- **Status**
- **WBS Interfaces**
- **Organization**
- **Schedule Milestones**
- **Cost Plan**

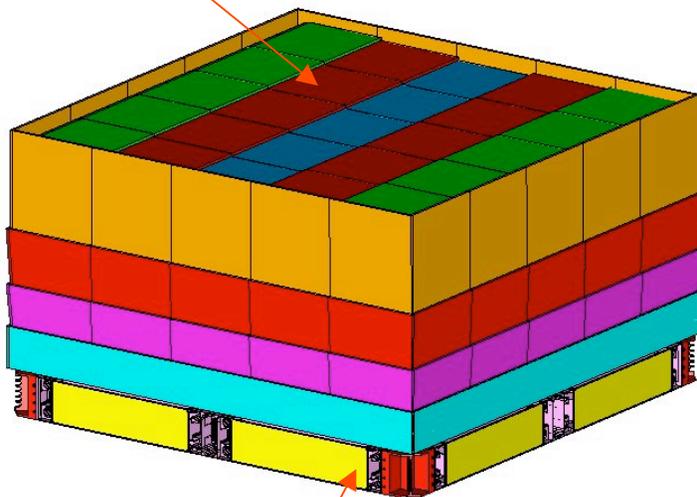


Anticoincidence Detector Overview

Prototype ACD tile
read out with
Wavelength
Shifting Fiber



Tile Shell Assembly
(TSA)



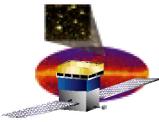
Base Electronics
Assembly (BEA)

• TILE SHELL ASSEMBLY

- 89 Plastic scintillator tiles
- Waveshifting fiber light collection (with clear fiber light guides for long runs)
- Two sets of fibers for each tile
- Tiles overlap in one dimension
- 8 scintillating fiber ribbons cover gaps in other dimension (not shown)
- Supported on self-standing composite shell
- Covered by thermal blanket + micrometeoroid shield (not shown)

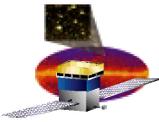
• BASE ELECTRONICS ASSEMBLY

- 194 photomultiplier tube sensors (2/tile)
- 12 electronics boards (two sets of 6), each handling up to 18 phototubes. High voltage power supply on each board.



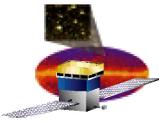
ACD Heritage

- **Plastic Scintillator** - used in all previous gamma-ray telescopes OSO-3, SAS-2, COS-B, CGRO (all 4 instruments), plus many cosmic ray experiments.
- **Waveshifting fibers** - used in GLAST LAT Balloon Flight Engineering Model (BFEM). Waveshifting bars used by HEXTE on RXTE (same material in a different geometry)
- **Photomultiplier tubes** - used in all previous gamma-ray telescopes. HEXTE/RXTE used a commercial version of the same tube we are using (Hamamatsu 4443), and GOLF on SOHO used the same tube as the ACD except for the cathode material (Hamamatsu 4444)
- **High Voltage Bias Supplies** - used in all previous gamma-ray telescopes. The designer of the ACD HVBS designed one of the EGRET supplies.
- **Electronics** - similar ASIC's (same designer) used on the BFEM. Electronics group has substantial space flight experience.

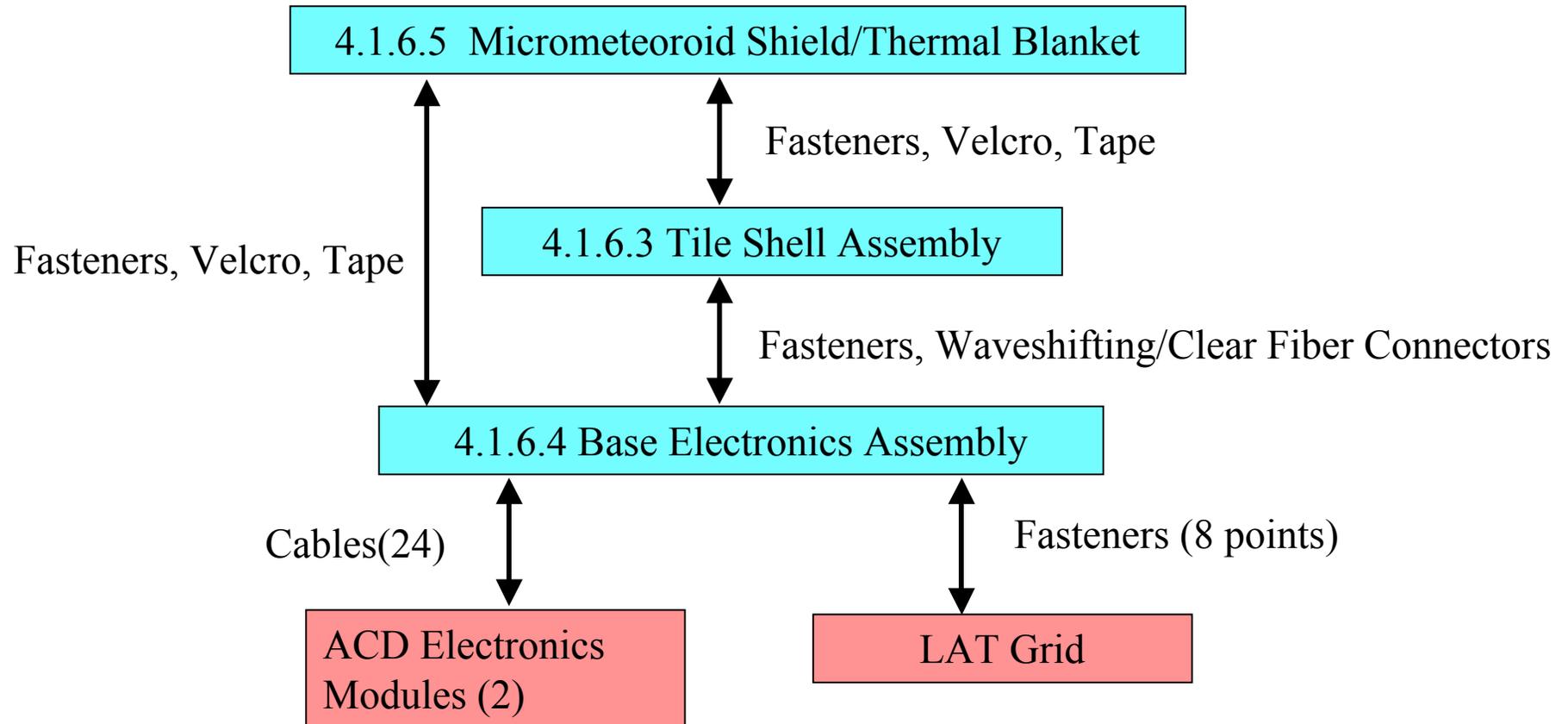


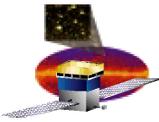
Anticoincidence Detector Status

- **Designs for the Tile Shell Assembly (TSA) and Base Electronics Assembly (BEA) have been finished.**
- **Contract was established with Fermilab for preparing the scintillator tiles. Prototype Tile Detector Assemblies are being made now.**
- **A preliminary version of the analog ASIC has been made and is being prepared for testing. A second prototype is in fab.**
- **A contract for purchase of the photomultiplier tubes is being negotiated with the vendor.**
- **All action items that were identified at the pre-PDR review have been completed.**
- **Descope and rebudgeting of the ACD was completed. Integration of revised WBS, schedule, and interfaces into PMCS is nearly done.**
- **Analysis of reliability and possible failure modes was carried out:**
 - **Two sets of fibers, 2 phototubes per tile, with separate electronics.**
 - **12 electronics cards (2 sets of 6), each with a high voltage supply.**

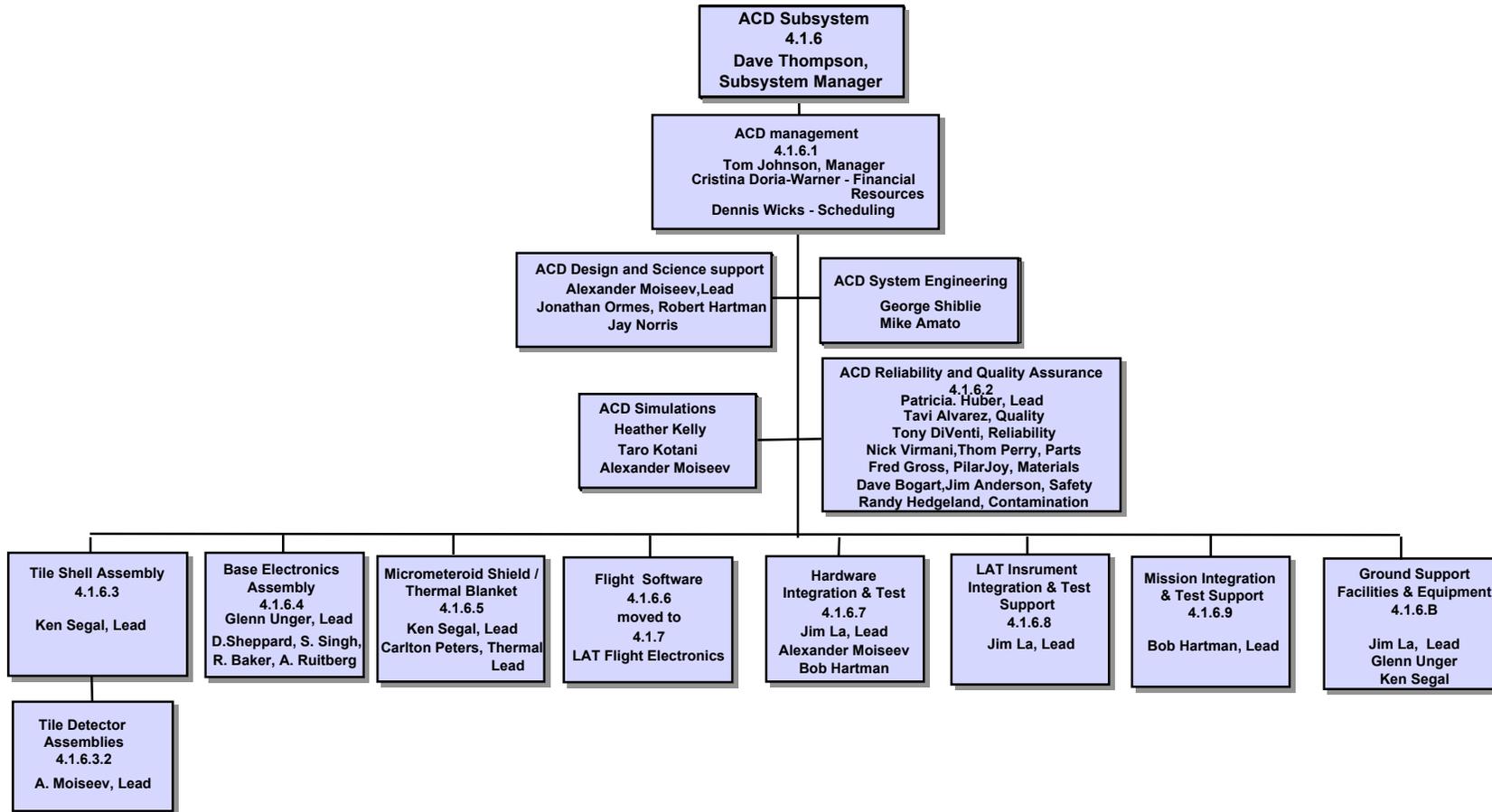


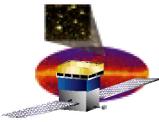
ACD Subsystem WBS Interfaces





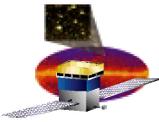
ACD Organization Chart





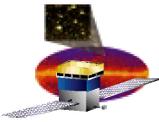
Level III Key Milestones

- **Prototype ACD Electronics Module received** 3/15/02
- **First EGSE system received** 3/15/02
- **Deliver prototype high voltage bias supply** 6/03/02
- **Deliver prototype test/screening board with ASIC
for electronics interface testing** 7/01/02
- **Deliver calibration unit description** 1/03/03
- **Fit test of ACD BEA with Grid** 5/08/03
- **Deliver ACD calibration unit components** 10/31/03
- **Deliver tested flight unit ACD** 4/26/04



Selected Level IV Milestones

- **Ten qual unit photomultiplier tubes received** 3/01/02
- **First run analog ASICs received** 3/07/02
- **First run digital ASIC's received** 4/02/02
- **Engineering Tile Detector Assemblies tested** 7/02/02
- **Flight Tile Detector Assemblies received** 9/19/02
- **Flight High Voltage Bias Supplies complete** 1/14/03
- **Flight shell complete** 2/07/03
- **Flight Tile Detector Assembly testing complete** 3/17/03
- **Flight base frame complete** 3/19/03
- **Flight tile shell assembly integration/test complete** 8/25/03
- **Flight base electronics integration/test complete** 10/09/03
- **Flight Unit ACD environmental tests complete** 3/30/04



ACD Cost & Commitments

