PEER REVIEW (July 26) ACTION ITEMS

Item No.	Question/ Action Item	Response	Due Date	Responsible Person	Status C/O
Reliability					
P-01	Reliability analysis at LAT level must address ability of other LAT subsystems to backup ACD functions.			Steve Ritz	O
P-02	Effect at LAT system level on efficiency in event of one tile loss needs to be addressed.			Steve Ritz	O
P-03	Quantify number of fibers that can be lost per tile before a failure mode kicks in. How many can we withstand before a tile must be replaced?		9/10	Bob Hartman (Alex Moiseev)	O
P-04	Need to address how many failures can be tolerated in each area: tiles, cables, connectors, electronics, etc.		9/10	Bob Hartman (Alex Moiseev)	O
P-05	Will the reliability estimate for the ACD ASIC (and any other estimated parts) be updated with actual lot test data for the specific device(s)? (Specifically for those devices without flight heritage). When will the reliability analysis be updated? What is the backup plan in the event of a device failure? Concern that a device failure be identified early enough to pursue a different path (if necessary) such that schedule is minimally impacted.			Tony DiVenti	O
P-06	Revisit reliability allocations to establish firmness, before allocations are used to drive potentially costly design solutions.			Tony DiVenti	O
Requirements					
P-07	Need to have a clear definition of how requirement compliance will be documented and what the deliverables to the LAT instrument and GLAST Project will be.			Rudy Larsen	O
P-08	Submit mass change to IDT/CCB. Need to establish an ACD mass allocation with reserve to prevent unnecessary work.			George Shiblie	O
P-09	ACD efficiency is required to be 99.97% (total - overall). All efficiency seemed to be allocated to detectors. How is the efficiency distributed among tiles, fibers, PMT response, noise, etc?		8/30	George Shiblie	O
P-10	A clear efficiency specification on the discriminator channel is needed. Is it 0.9997?			Bob Hartman	O

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P-11	It appeared during presentation that all requirements have not been fixed and frozen. Is there good clear agreement between ACD and LAT on requirements?			George Shiblie (Rudy Larsen)	O
P-12	Complete the Level IV requirements and include traceability of requirements derivation.			George Shiblie	O
P-13	Requirements need to address the 2920-10H alternate launch vehicle (design loads, pressure venting profile, etc). Note, this comment was an advance notice from Joy Bretthauer of a possible change to the Mission System Specification.			George Shiblie	O
Fiber Connectors					
P-14	Provide the rationale by which using the green waveshifting fibers are worth the risk of having the additional 89 waveshifting/clear fiber connectors. Those connectors may prove problematic due to process control, workmanship, thermal cycling and vibe.			George Shiblie	O
P-15	Does the process for terminating fibers into the fiber connectors ensure a good-to-high yield with a low probability of defects due to: cracking, scratching, breaking, contamination, which can be realized after flight qualification testing the connector? Recommendation: Contact Melaine Ott via Tony DiVenti and Tavi Alvarez to assist with guidance with this matter. John Kolasinski is another good source on this topic.			Tom Johnson	O
P-16	Need a detailed plan for qualification of optical connector. Address statistical probabilities in test samples and analysis.			Tom Johnson	O
P-17	How do fiber connectors maintain alignment after they are assembled?			Tom Johnson	O
P-18	How is the integrity of the fiber connection verified after a demate/mate?			Tom Johnson	O
P-19	How are fibers and harnesses protected from damage due to tight bend radius, handling damage, etc. during routing?			Tom Johnson	O
P-20	How are the following issues with the fiber connectors addressed? a. molding fabrication, tolerances, shrinkage, misalignment,			Tom Johnson (Tony	O

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	curing, etc. b. thermal expansion of molded pieces and their impact on fiber alignment. c. Failure and reliability analyses			DiVenti/ Tavi Alvarez)	
P-21	Manufacturing and assembly processes need to be documented and reviewed.			Tom Johnson	O
Integration and Test					
P-22	What is the schedule risk associated with a failure during environmental testing?			George Shiblie	O
P-23	GSE, simulators and their needed delivery dates need identification for all ACD subsystems.			Rudy Larsen (Tom Johnson/ Dave Sheppard)	O
P-24	Assembly and integration sequence for ACD should be detailed. Show minimum plan to address removal of each LAT subsystem for rework, after full-up integration complete. Identify and special GSE, etc for these operations.			Jim La (Tom Johnson)	O
P-25	Address detail of shipping to SLAC and integration at SLAC. Will ACD team perform integration? Is this scheduled and costed?			Jim La (Rudy Larsen/ Tom Johnson)	O
P-26	Crane height at SLAC appears to be an issue. (This should be addressed in the Integration and Test Plan and with handling fixtures used for both assembly and integration).			Tom Johnson	O
P-27	Who will do integration of the tiles to structure to electronics to GSE, etc? Who has the responsibility for delivery of the tiles?			Tom Johnson	O
P-28	Can ACD be totally tested without ACD-TEM and ACD-computer?			George Shiblie (Dave Sheppard)	O
P-29	Where are the lifting points for the EGSE sling? How tall is the sling/ACD combination?			Tom Johnson	O

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ACD Coverage – ACD coverage was determined to be an IDT issue requiring system-level analysis and coordination. The related comments are captured here for the record.					
P-30	Monte Carlo Simulation tells that: 1. 300 MeV electrons will leak thru cal. Corner and the ACT/TKR gap. The rate is > 0.01 cts/sec. 2. 100 MeV electrons will leak thru cal corner and the ACD/TKR gap. The rate is > 0.1 cts/sec or a few x 10^{-5}/cm^2·s, or a few x extragalactic diff background. There should be some ACD coverage all around cal near the top of cal. Probably down to 5-10cm from the top of cal. Then the background 1), 2) will be $\leq 10^{-5}$/cm^2·s.		9/7	Bob Hartman	O
P-31	Science team needs to quantify impact of gap between ACD and CAL.		9/7	Bob Hartman	O
P-32	Mechanical trade activity should be opened to evaluate feasibility of closing gap between the ACD and calorimeter. This should be addressed at LAT mechanical system level as well.			George Shiblie (Tom Johnson)	O
P-33	Bottom tile overlap with CAL depends on pending analysis, but this has big potential impact on mechanical and electronics packaging of ACD. Can bottom tile be extended down without impacting ACD packaging?			George Shiblie (Tom Johnson)	O
Thermal Design					
P-34	Clearly define the operating temperature.			George Shiblie (Carlton Peters)	O
P-35	Establish and document thermal operating and survival environments and required conduction paths. Address the need for thermal gaskets.			Carlton Peters	O
P-36	Why are survival heaters needed? The LAT has limited power for survival heaters. This must be coordinated with Gunther, Since it impacts power, and Martin, since it impacts LAT Thermal design.			Carlton Peters	O

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P-37	Need more accurate thermal modeling of thermal blanket, micrometeorite shield, ACD tiles, and shell to tie in with LAT-level thermal analysis.			Carlton Peters	O
P-38	The mass budget includes an allocation for heaters and thermostats. How are these used, how much power do they require, where are they located, and how are they controlled? Where are the temperature monitors mounted that are referenced by the thermostats. (PDR chart 104)			Carlton Peters	O
P-39	How are the TBD temperature requirements going to be resolved and when? (PDR chart 111)			Carlton Peters	O
P-40	The thermal conduction path between the boards and the grid is to be modulated by thickening the frame. Does the current mass estimate include sufficient margin to accommodate the expected thickening? (PDR chart 112)			Tom Johnson	O
P-41	The thermal analysis as performed was based on conduction only. What is the radiatively coupled environment? Does analysis justify this approach. (PDR chart 114)			Carlton Peters	O
PMT Issues					
P-42	Can only one PMT be used as baseline? Is there enough margin? If two are needed, how do they operate together? Clarification and failure modes analysis is needed. (Note, chart 58 of the presentation seemed to indicate a possibility that one PMT per tile could be used, but Jonathan Ormes stated in the review that two PMTs per tile will be used.)			Alex Moiseev	O
P-43	What is the specific light yield specification for tile to PMT? How is this related to Inst performance? What is performance reqt of PMT? What margin is there between design and minimum design reqmts?			Alex Moiseev	O
P-44	What is the worst case gain/ degradation for the actual PMTs selected for the mission estimated over 10 years. Is the answer sufficient to support the 10 yr GLAST mission goal?		9/10	Bob Hartman (Alex Moiseev)	O
P-45	How many PMTs failed on SOHO? (PDR chart 67)			Dave Thompson	O

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Other Issues					
P-46	Fabrication and qualification of fiber ribbons needs to be detailed			Tom Johnson	O
P-47	Based on EGRET number of incidents (stated to be extremely low), is the incorporation of the crown feature of the tiles worth the added design complexity and cost? Could this go on descope list?			Alex Moiseev	O
P-48	Address 4 pt vs 3pt mount of tiles, to shell.			Tom Johnson	O
P-49	Has risk of building to cost been assessed and accepted by project. Will the ground rules be changed later?			Rudy Larsen	O
P-50	Perform contamination control survey based on current design. Identify potential problems with material selections/ processes.			Chris Lorentson	O
P-51	Is TSA conductive? The shell needs to bleed off charge. It should have resistivity of about $< 1M\Omega$/square.			George Shiblie	O
P-52	Aging of the adhesive between fibers and scintillators needs to be evaluated. Adhesive aging could lead to cracking and loss of light. INTEGRAL IBIS experienced such problems. Need test with large numbers of thermal cycles for example.			Alex Moiseev (Fred Gross)	O
P-53	Are there significant shaping times and 'memory' times associated with the ACD that could cause pile-up problems for ACD signals? (see J. J. Russell's email in Appendix A.)			Dave Shepphard	O
P-54	Why is the separate spacecraft analog housekeeping cable listed as an internal ACD interface and not part of the external harness? What signals are on this cable? (PDR chart 27)			George Shiblie	O
P-55	It appears that the engineering model and calibration unit are delivered only a few months prior to the flight unit. This does not appear to leave time for implementation of any changes determined from the EM. Can the EM delivery be accelerated or the flight unit delayed? (PDR chart 30)			Rudy Larsen	O
P-56	How many TEM boards and EGSE configurations is the ACD team requesting and on what schedule?			Dave Shepphard (Rudy Larsen)	O

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P-57	How does the design provide minimum gaps between tiles? (PDR chart 39)			Tom Johnson	O
P-58	Is it possible to represent the shingling approach in a side view? Are there fiber guides supporting the shingled tiles? (PDR chart 96)			Tom Johnson	O
P-59	What provisions have been made for venting the ACD? Is the design supported by analysis? (PDR chart 97)			Tom Johnson	O
P-60	How do the TDA tie downs accommodate the shingling overlap of the tile? Are there fiber guides underneath the shingled TDA in compression? Do the fiber guides provide the resistance against TDA slip in shear? (PDR chart 101)			Tom Johnson	O
P-61	How is the micrometeorite shield/thermal blanket attached to the TDA/shell combination? Are standoffs used? How far down the ACD/GRID does the micrometeorite shield go? How about the thermal blanket? (PDR chart 103)			Tom Johnson	O
P-62	On a shuttle program the structure for the instrument was identified as secondary structure. A rule was applied that the design loads were to be the superposition of the quasi-static loads and the equivalent random vibration loads. Can you confirm that this approach is not required here? (PDR chart 105)			Tom Johnson	O