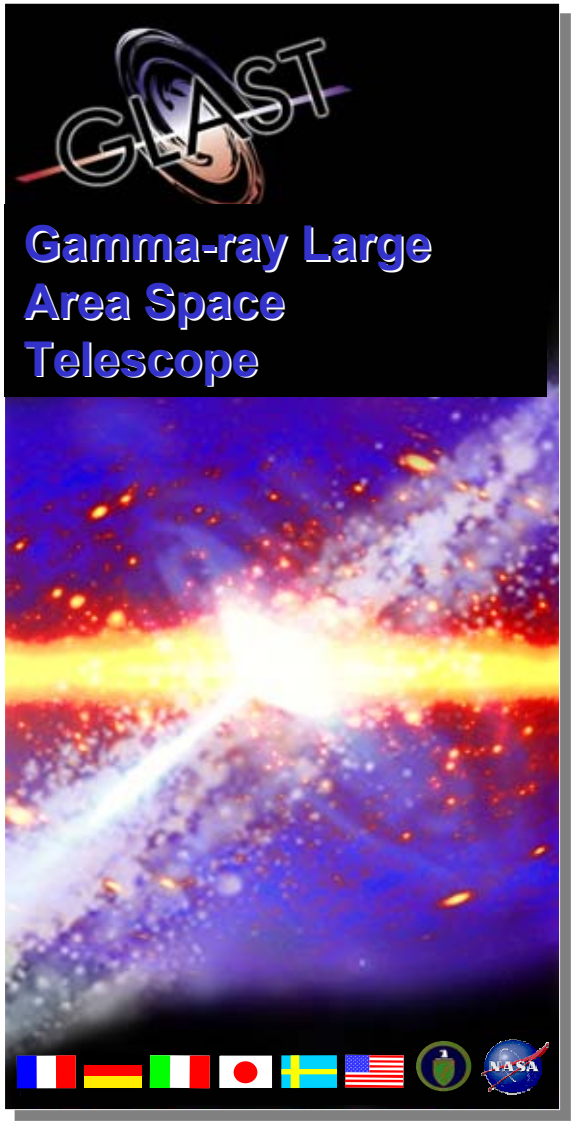

GLAST Large Area Telescope

End-to-End Testing (Airplane Test) Risk to the Science

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Instrument Science Perspective Summary

- Formally, the purpose of the airplane test is not to verify any of the science performance requirements.
  - The airplane test is more a functional test than a performance test.
  - The science performance is verified by other means.
- However, if the LAT doesn't meet all its requirements science is threatened. The remaining comments are given in this broader context.
- There is general agreement that
  - there should be no rational doubt that LAT will meet its requirements when it is delivered to Spectrum Astro.
  - no test should be done because it is "a good idea". Only tests that are necessary should be performed.
  - the risks of NOT doing the test must be shown to be larger than the risks of doing the test.

Risks of Not Doing the Test

- **We missed something in our test plan and procedures.**
  - **The test plans and procedures (not including the airplane test) must be scrutinized for holes and what-if's. If there is a logical hole, it must be addressed. Inability to address an issue by other means implies the airplane test is necessary IF the airplane test fills the hole.**

- **We have an insufficient understanding of the system dynamics, or one (or more) of our assumptions – tacit or explicit – concerning the response of the instrument to the environment is wrong.**
  - **fluxes: there is flexibility and margin in our design, and there is experience from the balloon flight.**
  - **instrument model: details of particle interactions will not change the rates and data volume by large factors. These may matter for the ultimate background rejection on the ground, but the airplane test doesn't address that (but we do have important additional experimental handles on orbit to address this). There is flexibility in the trigger system and margin in the calculated rates.**
  - **data acquisition system: ask the experts. Go back to top bullet.**

Risks of Doing the Test

- **Everything has an opportunity cost. Time, money, and effort expended on the airplane test are taken from other activities.**
  - **Needs a complete assessment of cost (people, time, hardware), taking into account all dimensions of the test. The shift of resources away from other areas to the test might introduce new problems (work quality, schedule).**
  - **The test comes late in the program. People may inadvertently spend less effort uncovering problems earlier if they know the end-to-end test will be done.**
- **It imposes new requirements on the instrument, which is not designed to run while vibrating.**
  - **We must have our own strict guidelines for handling flight hardware. Common sense is important, but it is not enough. We must prove (to ourselves and all the committees) the test will not damage the instrument. The airplane test plans and procedures must be scrutinized for holes and what-if's. This is part of the cost of the first bullet above.**
- **The success criteria are not precisely defined.**
  - **This means the test itself is not precisely defined. This must be done ASAP to do the assessment reliably.**
  - **The programmatic implications of unclear results or problems must be worked through now.**