

## C) Draft RFI for Air Freight Shipment

### Request For Information for the Air Freight Shipment of the GLAST LAT

#### Background Information for the shipper:

1) We are requesting information for the airplane shipment of GLAST ("Gamma Large Area Space Telescope"). GLAST is a major NASA instrument that cost approximately \$150M and has taken 10 years to build. It will be launched into orbit in 2006 to view high energy gamma rays coming to Earth from black holes and gamma bursts at the edge of our known universe. These gamma rays will have to be separated out from a much larger background of cosmic rays (protons and electrons) which will also be hitting the instrument.

2) In July, 2004, the GLAST instrument must be shipped from Stanford University in Palo Alto, California to the Naval Research Lab in Washington, D.C. for a variety of pre-observatory integration tests. During this airplane flight, we would like to turn GLAST on and record cosmic rays to verify that the instrument can reject them. It turns out that the flux of cosmic rays at 25,000 feet in an airplane is the same as GLAST will experience in orbit. At 35,000 feet, we will be able to test the instrument with twice the orbital flux of cosmics. The shipment should be on a regularly scheduled, direct, non-stop flight from any San Francisco Bay Area airport to any Washington, DC area airport in July, 2004. There would be a possible return shipment 5 months later of the same unit.

3) For the airfreight shipment, GLAST will be shock mounted within a rugged shipping box made of aluminum plate reinforced with ribs. The forks of a forklift will slide under the shipping box for lifting and moving it. Some particularly careful handling during loading will be required. Points for attaching tie downs to the box will be provided after consultation with the shipper. The box will be designed after feed back from this request for information.

4) A pressurized (2200 psi) Nitrogen (non-flammable, non-explosive, non-toxic) gas cylinder (approximately 8" diam x 60" long) will be securely mounted on the top of the shipping box. Nitrogen gas at approximately ¼ cubic feet / min will flow through the box and be vented into the interior of the airplane. The interior of the box will be at the ambient external pressure within the airplane.

5) Approximately 4 Kw of power will be required from the airplane's generators. This power will be used for a 28 volt (2 Kw) power supply for the instrument and a chiller (2 kW) to cool the instrument when it is turned on. Both power supply and chiller will be securely fastened to the shipping box. The chiller will exhaust its waste heat to the air of the airplane cabin. During ground handling, the instrument will be turned off, and no external power will be required.

6) The shipping box should be loaded into a pressurized area of the airplane. Two of our people should be able to view the loading and accompany the unit on the flight. They will have a small laptop computer which will plug into a connector on the shipping box and will take data from the instrument during the flight.

7) The approximate external dimensions of the shipping container are:

90" (Length) x 90" (Width) x 76" (Height from the ground to the top of the horizontal gas cylinder)

8) The estimated weight of the entire shipment is:

8500 lbs

9) This shipment contains no radioactive sources or other hazardous materials.

Requested information:

A) Is this shipping scenario possible on your aircraft? If not, what modifications would make it acceptable?

B) Are we close to any limits on shipping container size or aircraft floor loading limits?

C) Can the nitrogen gas cylinder be a standard DOT approved cylinder, or does flying on an airplane entail extra requirements?

D) What would the aircraft and interior location our shipping box be?

E) What voltage (120 VAC?) and frequency (400 Hz?) is available on the aircraft to supply the 4 Kw that we need?

F) How often might you have suitable flights in July, 2004?

G) We would appreciate any information you may think relevant (eg: aircraft loading door size, tie down method, ...).

H) What is an estimated shipping cost for one way? What is the estimated shipping cost for a round-trip ?