

# GLAST Large Area Telescope:

## Data Challenge Overview Rome Collaboration Meeting September 2003

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The poster for the GLAST-LAT International Collaboration Meeting features a central image of a spiral galaxy superimposed over a courtyard in the Palazzo Corsini. The text on the poster includes the meeting title, dates, location, and logos of the participating organizations: NASA, the Accademia Nazionale dei Lincei, INFN, and the University of Turin. A vertical strip on the left shows the flags of France, Germany, Italy, Japan, Sweden, and the United States.

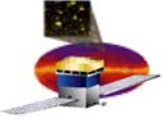
GLAST - LAT  
International Meeting  
Roma Sept. 15-18 2003

GLAST-LAT International  
Collaboration Meeting  
Roma, Sept. 15-18 2003

ACCADEMIA NAZIONALE DEI LINCEI  
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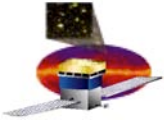
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# Outline

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- **Data challenge purposes and scope**
- **Approach – a progression of data challenges**
- **Boundary conditions, preparatory work**
- **Schedule**
- **Overview of session**
- **Summary**

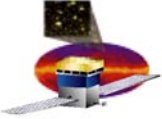


## Purposes of the Data Challenges

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- **“End-to-end” testing of analysis software.**
- **Familiarize team with data content, formats, tools and realistic details of analysis issues (both instrumental and astrophysical).**
- **If needed, develop additional methods for analyzing LAT data, encouraging alternatives that fit within the existing framework.**
- **Provide feedback to the SAS group on what works and what is missing from the data formats and tools.**
- **Uncover systematic effects in reconstruction and analysis.**

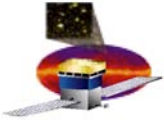
**Support readiness by launch time to do all first-year science.**



# Data Challenge Planning Approach

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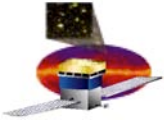
- **Walk before running: design a progression of studies.**
  - **DC1. Modest goals. Contains most essential features of a data challenge (see following slides).**
  - **DC2. More ambitious science goals. Encourage further development, based on lessons from DC1.**
  - **DC3. Support for flight science production.**



# Data Challenge Progression

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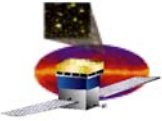
- **DC1**
  - **modest goals:**
    - 1 simulated day all-sky survey simulation (3M bkgd+gamma events to ground, => 400M generated events)
    - find flaring AGN, a GRB
    - single-day point source sensitivity. daily quicklook analysis development.
    - recognize simple hardware problem(s)
    - a few physics surprises
    - exercise:
      - exposure, orbit/attitude handling, data processing pipeline components, analysis tools
    - use existing recon, bkgd rejection and instrument response to show the problem areas that need improvement. secondary goal (not required) is to prototype improvements
  - **baseline schedule:**
    - Sept-Oct startup problems resolution.
    - Nov-Dec high-level tools beta testing. Finalize instrument response functions.
    - Dec 15 high-level tools release, workshop.
    - mid-January: interim reports (vrvs or face-to-face)
    - Feb 2004 closeout, and plan for DC2 (see later slides).
    - Then, break for flight I&T start. Use the time for fixing problems learned in DC1, software advances, etc.



# Boundary Conditions, Preparatory Work

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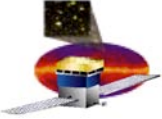
- **Very large effort during the past ~6 months (see Tracy Usher's talk):**
  - geometry reviews
  - underlying physics problems in G4
  - onboard filter embedded
  - general infrastructure
  - **Debug everything (keep doing this !!)**
  - source fluxes (still a bit more in Sept/early Oct)
- **Instrument analysis:**
  - done previously with earlier tools for AO, PDR, etc., demonstrating LAT meets requirements. Now ready to do again with new tools.
  - pieces in place: geometry, underlying physics, and subsystem (tracking, PSF, energy) analyses stable
  - background rejection, performance evaluation and parameterization close
  - See Bill Atwood's talk
    - huge effort. gone through first iteration. more work to do; path is clear.
- **Science tools**
  - See talks by Richard Dubois and Pat Nolan
- **Effort to plan DC schedule in context of other work:**
  - Reviews...
  - EM support
  - Other calibration planning and development
  - Construction, Integration, and Test planning and execution



# DC Progression

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- **DC2 (preliminary!)**
  - **more sophisticated goals:**
    - 1 simulated month all-sky survey simulation (100M bkgd+gamma events post-filter. Method TBD) PLUS 1 simulated year of gammas
    - find AGN, bursts, pulsars
    - produce a toy 1-month catalog
    - detailed point source sensitivity and localization analyses
    - recognize more subtle hardware problems
    - a few more physics surprises
    - exercise:
      - exposure, data processing pipeline, analysis tools, quicklook. benchmark processing times, data volume, etc. connect to SSC.
    - use updated recon, bkgd rejection and instrument response to show the problem areas that need work. encourage improvements

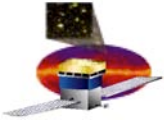


# DC Progression

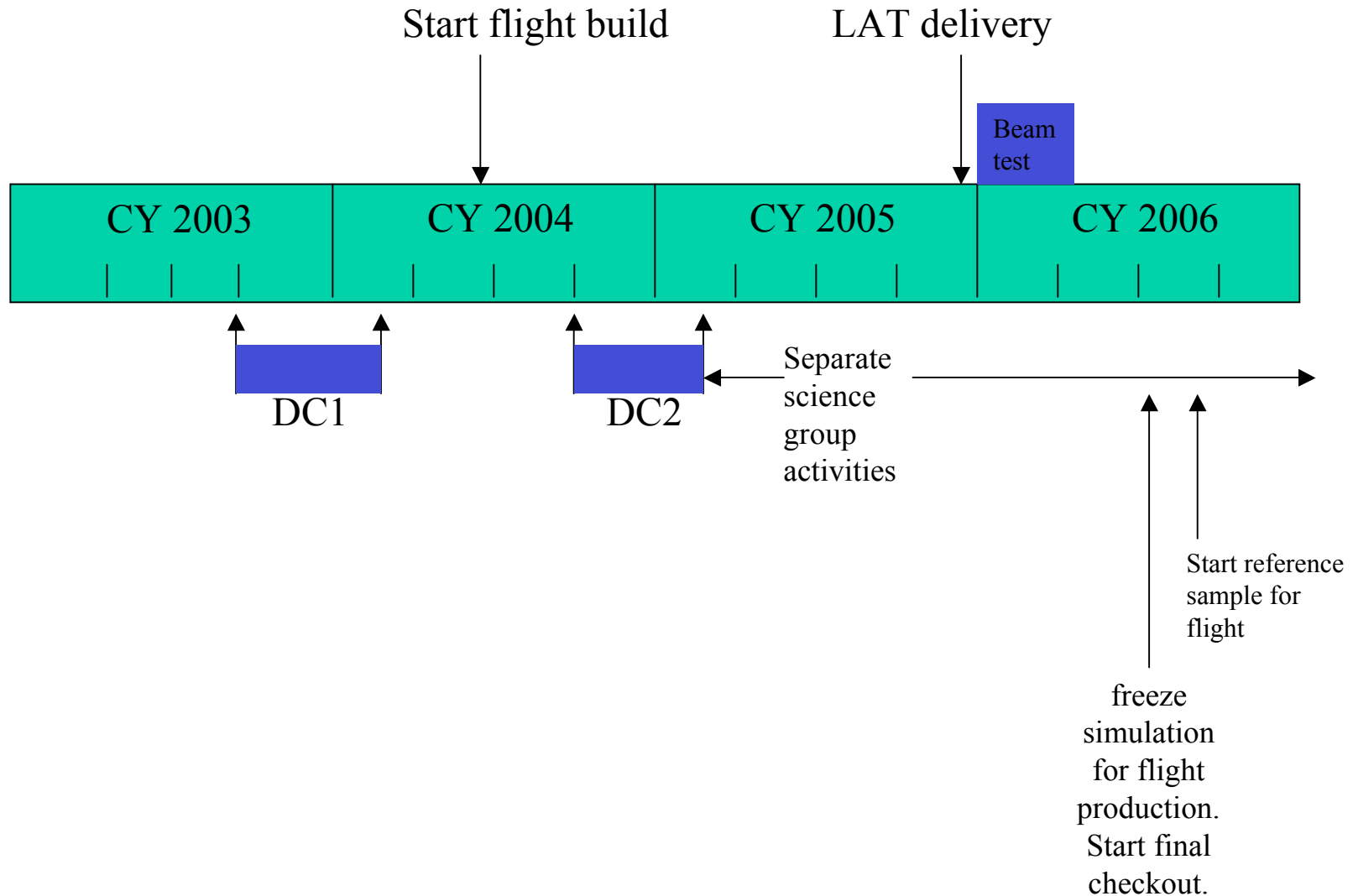
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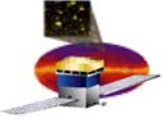
- **“DC3” – Flight Data Challenge! Preliminary plan.**
  - physics groups will have been working on detailed analyses, based on experience with DC2, during the previous year.
  - main goal is realism to support running experiment analysis:
    - 1 full simulated year of data (methods TBD)
      - exercise everything: format data as it comes into the IOC. also confirm data storage, backup, processing speed. will be the reference sample for 1<sup>st</sup> year data analysis.
    - connect to SSC
    - demonstrate point source sensitivity and localization
    - recognize a few very subtle hardware problems. recognize a few realistic daily hardware problems -> feed to IOC and FSW.
    - physics surprises
    - use updated recon, bkgd rejection and instrument response. this will be our initial science performance. by this time, physics analysis groups should be up and running.





# Data Challenges Schedule Summary

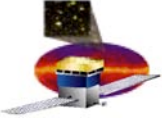




# Implementation

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- **A small, international organizing committee will be put into place by Peter for DC1. Each person on the committee will have a clearly defined set of responsibilities for coordinating and overseeing the components of the work.**
- **The organizing committee will have a well-defined, prioritized list of plots and other results to be produced by data challenge participants.**
- **Review lessons from DC1, and re-evaluate scope and schedule for DC2 (and DC3) as appropriate.**



# Session Agenda

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- **Simulation and recon status** - **Tracy Usher**
- **Science tools overview/status** - **Richard Dubois (for Seth Digel)**
- **Instrument response studies** - **Bill Atwood**
- **GLEAM tuple and event display** - **Leon Rochester**
- **Using the science tools** - **Pat Nolan**