

# Particle beam tests for the GLAST-LAT Calibration

## Particle beam tests for the GLAST-LAT Calibration (oral presentation)

On behalf of the Beam Test Team

### Abstract

The calibration strategy of the GLAST Large Area Telescope combines analysis of cosmic ray data with accelerator particle beams measurements. An advanced MonteCarlo simulation of the LAT, based on the Geant4 package, was setup to reproduce the LAT response to such radiation, benchmark its performance throughout its entire operation and refine background rejection strategies.

To validate the LAT simulation, a massive campaign of particle beam tests was performed between July and November 2006, in parallel with the LAT integration and test, on the LAT Calibration Unit (CU). This is a detector built with two complete flight spare modules, a third spare calorimeter module, five anticoincidence tiles located around the telescope and flight-like readout electronics.

The CU was exposed to a large variety of beams, representing the whole spectrum of the signal that will be detected by the LAT, using the CERN and the GSI accelerator facilities. Beams of photons (0-2.5GeV), electrons (2-300GeV), hadrons (pions and protons, ~GeV-100GeV) and ions (C, Xe, 1.5GeV/n) were shot through the CU to measure the physical processes taking place in the detector and eventually fine-tune their description in the LAT MonteCarlo simulation.

This talk describes the motivations and goals of the test runs, the many different experimental setup used to select the required particles and trigger the CU, the measured performance of the CU and the first results of the LAT MonteCarlo validation.

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**Preliminary Content (feel free to modify/comment it!):**

### Introduction:

- Calibration strategy

### Main Tabs:

1. Discussion of different test beam configurations
2. Few event display
3. TKR Hit profile Vs. Energy for gamma and electron runs
4. CAL energy layer profile
5. Moreover, I would like to add a couple of slides by the posters that will not overlap the second talk

### Conclusions:

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### Material useful for the presentation

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### Useful links

- **1st Beam Test Workshop - Pisa, March 20-21, 2006:**
  - The LAT-CU Beam Test at CERN: introduction - L. Latronico ([ppt](#))
  - Particle Identification - N. Mazziotta ([pdf](#))
- **2nd Beam Test Workshop - Pisa, May 15-17, 2006**

#### PS Set-up:

- ◦ Current Status - L.Latronico ([ppt](#))
- ◦ Gamma tagger calibrations and optimization - N. Mazziotta ([ppt](#))
- ◦ Ancillary DAQ - F. Gargano ([ppt](#))
- ◦ Clean Electron Set-up - N. Mazziotta ([ppt](#))

#### SPS Set-up:

- ◦ Current Status and agreement with CERN - B. Lott ([pdf](#))
- ◦ PID - N. Mazziotta ([ppt](#))
- **3rd Beam Test Workshop - Pisa, June 28-30, 2006**
- ◦ Gamma tagger performance - L. Latronico ([ppt](#))
- **Beam Test Weekly VRVS - August 1st, 2006**
- ◦ Trigger: How to set it up - Luca/Nicola ([ppt](#))
- **GLAST Collaboration Meeting - Stockholm, 28-31 August, 2006**
- ◦ Report on LAT Beam Test - L. Latronico ([https://confluence.slac.stanford.edu/download/attachments/17664/beamtest\\_stock\\_06\\_lowres.ppt?version=1&beamtest\\_stock\\_06\\_lowres.pptppt](https://confluence.slac.stanford.edu/download/attachments/17664/beamtest_stock_06_lowres.ppt?version=1&beamtest_stock_06_lowres.pptppt))
- **Calibration & Analysis VRVS - January 15, 2007**
- ◦ Beam Test update - Luca/Philippe (<https://confluence.slac.stanford.edu/download/attachments/13899/15jan2007.pdf?version=1&pdf>)