Glast beam test at CERN

Glast Collaboration Meeting 2005

LAT beam test at CERN

- Main goals
  - LAT-TD-02152, see Steve slides
- Required beam types and related measurements
  1. tagged-photon beam 50MeV- ~GeV (PSF, 2-track recon, inter-tower dead space ….)
  2. Electron beam 1-~100 GeV (CAL calibrations, high energy leak corrections in CAL, ….)
  3. Hadron beam ~GeV
- Desired approximate beam time
  - 3 weeks for each beam type (including setup)
- Calibration unit configuration
  - 2 TKR towers, 3 CAL modules

Beams availability at CERN

Experimental areas

1. **Tagged γ beam available from CERN-PS, T7, T9 and T11 East Hall experimental areas**
2. **High energy electron beam available from CERN-SPS, H4 and H6 (if E ~100GeV) North Hall experimental areas**

Current general beam schedule

1. **CERN-PS physics runs: 5/15 – 11/3 2006 (3950 hrs)**
2. **CERN-SPS physics runs: 6/15 – 11/3 2006 (2950 hrs)**

Guidelines for beam requests

Glast is a recognized experiment (RE7) and beam requests are welcome

A call for beam requests from the SPS coordinator will circulate in September

Requests for beam time larger than 1 week can:

- **be split into more runs of 1 week each and be submitted to the SPS coordinator with a single request following his call; the standard form should be filled and a support/documentation proposal (max 4 pages) should be provided to the SPS coordinator. This way was suggested by the SPS coordinator**
- **be directly submitted to the SPS Committee and its chairman at least 3 weeks before the committee meetings (next meetings 9/27, 11/15); SPSC will discuss and eventually approve the request at the Research Board Meeting (12/1)**

Experimental areas for tagged γ beam

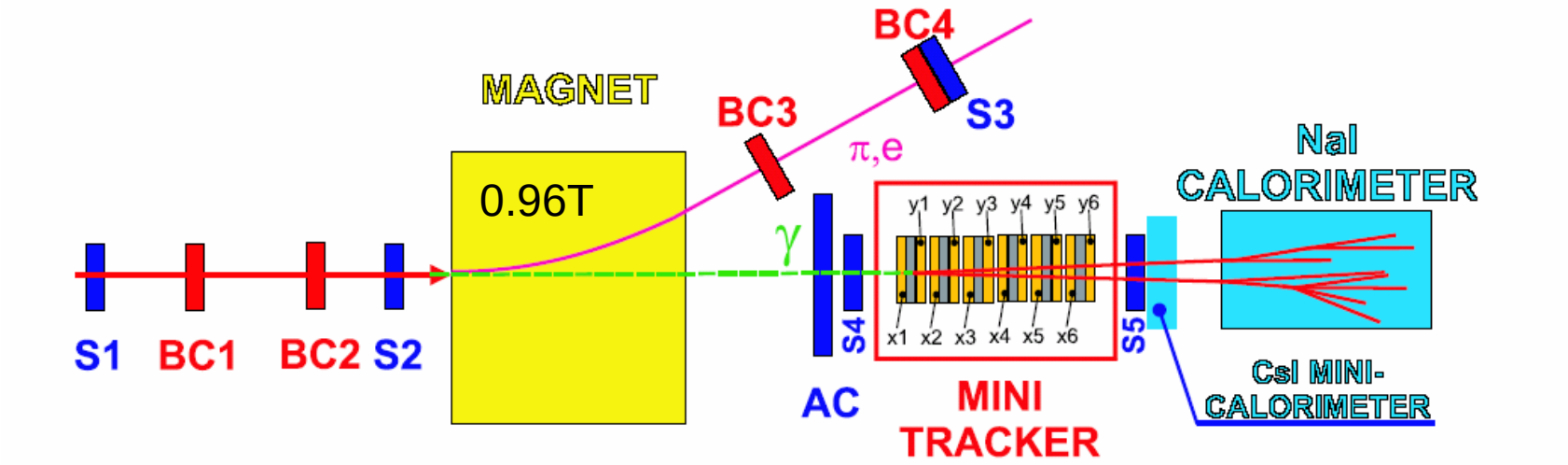
- **T9/T11**
  - **Maximum electron energy 15GeV (T9), 3.5GeV (T11)**
  - **Photon energy range : ~50MeV-~GeV**
    - **low energy threshold dependent on the position of the experimental apparatus in the hall; lower γ energy require positioning the apparatus far from the magnet to allow harder electrons (smaller deviations after the magnet) to be tagged before intercepting the apparatus**
  - **Beam dimensions: ~cm both in X (bending plane) and Y**
  - **Rates: SPS has a cycle of ~15s with 1 to 3 spills of 400ms flattop. AGILE collected 5M γ events in the 2004 run (~1 week of data taking)**
  - **Beam line equipment: cherenkov counters for particle ID, general equipment (gas, vacuum, N_2) available on request, control room away from the area (connection to DAQ via ethernet)**
  - **Beam purity: mixture of e^-, p, π, with e^- fraction rapidly decreasing with energy (<50% at 3GeV – see following slides)**

AGILE experience at T9

AGILE γ-tagging station at T9

M. Prest offered the AGILE setup and their experience (beam settings) to support a GLAST beam test.
They had the best experience in T9 (better beam, better line equipment), although almost a week was lost due to a beam tuning problem that was moving the beam spot away from the apparatus and which the AGILE team finally solved in conjunction with the beam line responsibles.
The following slides are taken from the T9 AGILE runs

The AGILE γ-tagging station at T9



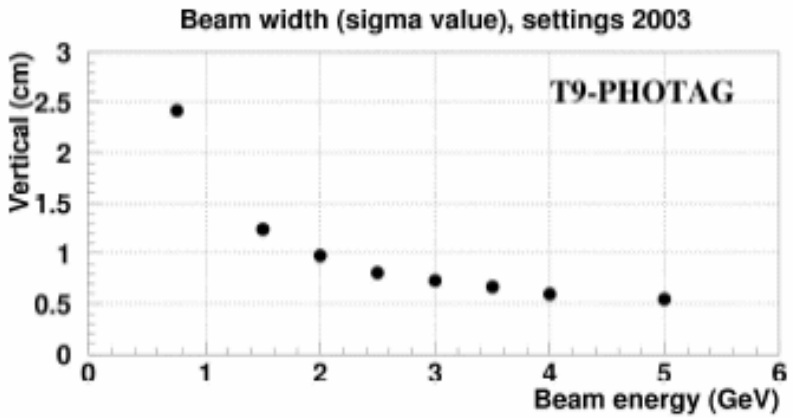
Tagging station performance:

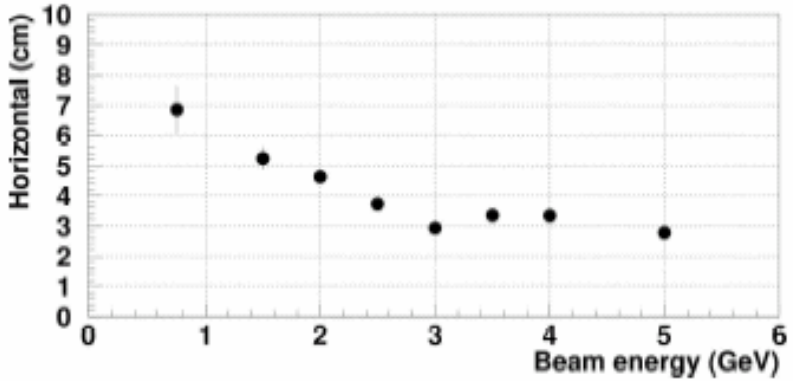
- S1, S2, S3: scintillators for trigger (S1&S2&S3 for γ acquisition)
- BCi: AGILE silicon detectors (~1/16 of a GLAST tray layer); used for e^- beams detection
- e^- deflection is measured with 5mrad resolution → momentum resolution is 2.5% $\Delta p/p$ + 2% from beam

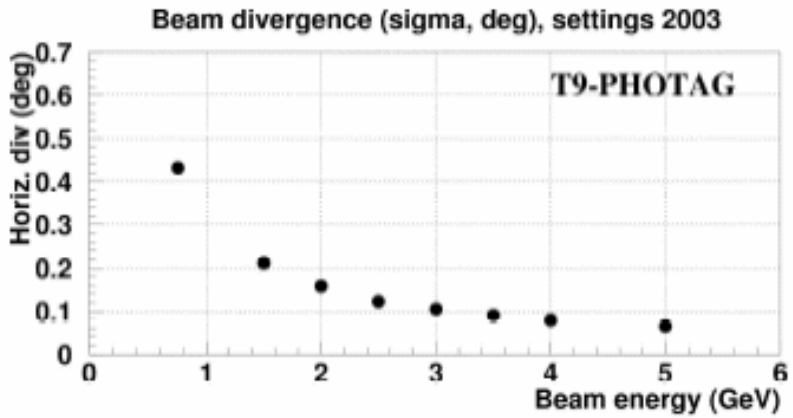
Comments:

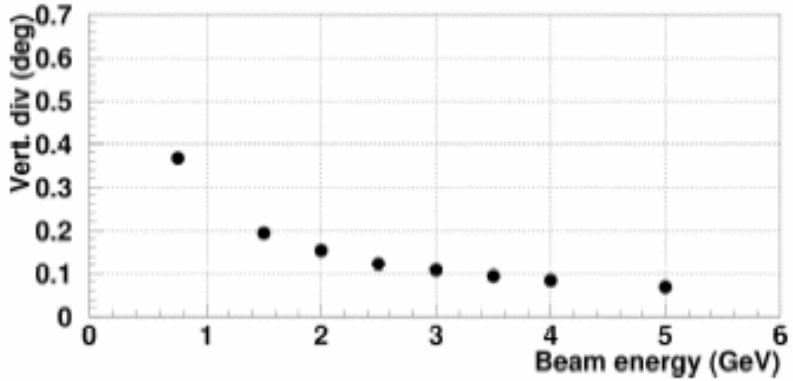
- AGILE is willing to provide the station, and an integration with the GLAT CAL was already performed in 2003 – integration with current TKR+CAL DAQ system is to be understood
- the TKR team could provide a similar setup using spare trays: integration of the DAQ would be simpler but we would have to build the system from scratch

T9 beam dimensions



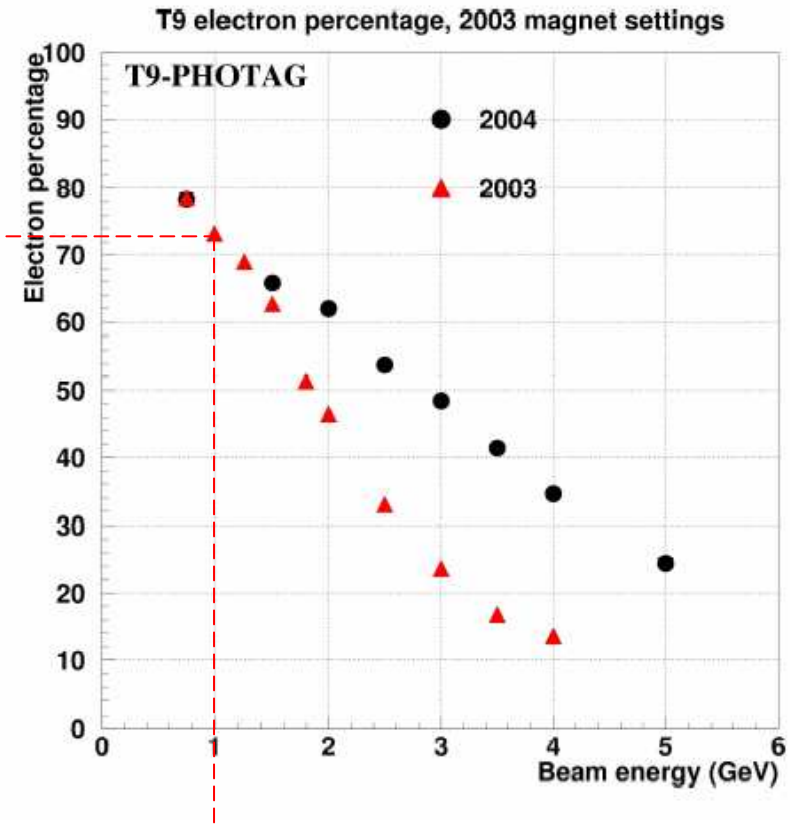


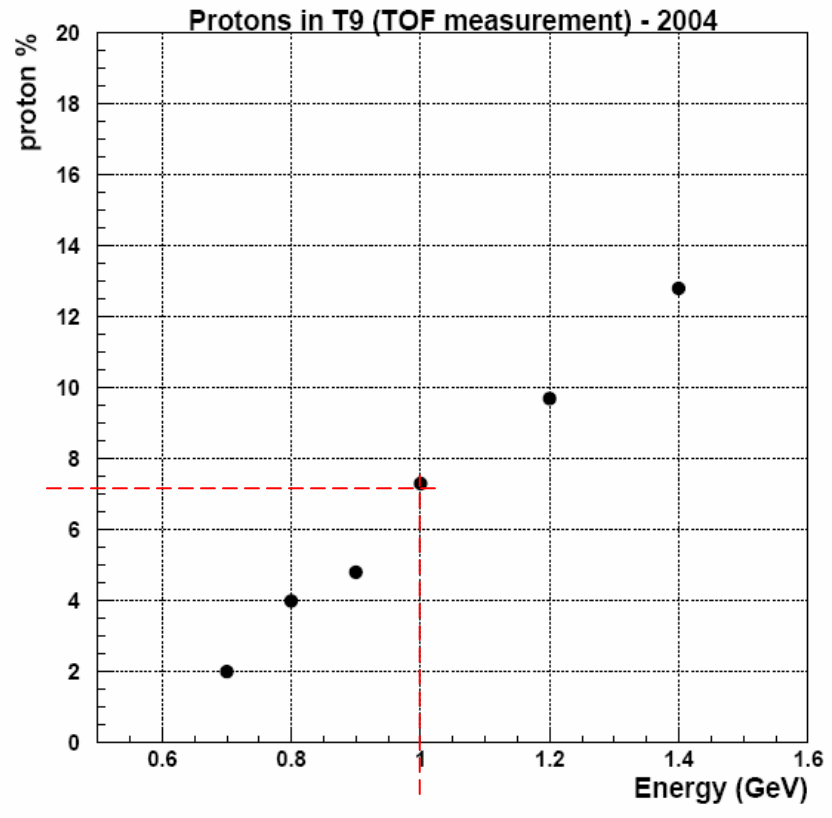




from M.Prest, AGILE 2003 run

T9 beam purity





The rest is mainly π, so at 1GeV the beam is ~7%p, 73%e, 20%π

from M.Prest, AGILE 2003/2004 runs