

BT Washington Collaboration Meeting November 2007

This page is gathering any piece of information needed for the Beamtest Status presentation due to the Collaboration Meeting in November 2007 in Washington

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Template

first attempt: [DRAFT](#)

- Instrument performances and features
 - what we understand and what we do not
 - e.g.: PSF, energy resolution, absolute energy scale, CAL xtalk, Tkr alignment...
- MC simulation
 - what we understand and what we do not
 - e.g.: beam line, physics list
- Angular resolution (Understood)
- Hadronic physics (Understood)
- Absolute energy scale (Not Understood)
- MC EM Shower profile (Not Understood)
- Potential impact of CU beamtest systematics upon LAT astrophysical measurements
- How we plan to study this issue

Comment(Elliott): In your talk I generally agree with the points. However, as I mentioned in the meeting on Wednesday, Nov7, the anti-quenching seen for heavy ions in the two GSI beam tests is still a mystery. Also, the comparisons that Ping has been making between dE/dx theory and GEANT (GLEAM) for the mean energy loss (using MC truth) show a sensitivity to the cuts on the muons. There is good agreement for muons between dE/dx theory and GLEAM for the mean energy deposit, but only for no cuts. Just making a mild directional cut on the muon in the CALdirZ parameter gives a few percent anti-quenching like effect of GLEAM MC vs theory. Preliminary results on protons and C using MC (Ping) and data (Yvonne) also show a strong dependence in the mean energy loss on cuts (in this case energy deposit, not loss). These effects seem to be angle dependent. Thus, I believe that we have a lot of work yet to understand these effects that are the basis of our energy calibration method on orbit. I would feel that we are taking a large risk in using the GSI anti-quenching results at face value in our calibration procedures.

List of all analysis topics

Instrument response

- PSF : from low energy photons to high energy electrons
- Energy : Absolute scale and Energy resolution
- Trigger efficiency
- ACD efficiency : CNO trigger at GSI

Instrumental effects

- Verify Timing in GSI data (Martin)
- CAL
 - pedestal drift
 - FHE/FLE study Autorange (ULD) (Tomi)
 - XTalk measurement and correction (Sasha)
 - alignment with the CU/Tracker (Philippe)
- TKR
 - High rates
 - FIFO analysis (Johan)
 - trigger efficiency
 - hot/dead/masked trips
 - Charge Sharing for ions
 - Alignment for the Data
- CsI Light Quenching measurement at GSI (Thierry)
- CsI Scintillation afterglow (Benoit)

MC simulation

- Tagger : Is MC understood ?
- G4 settings
 - Range cuts
 - LowEnergy Physics list for EM showers
 - QGSP_BERT Physics list for hadronic cascades
 - Geometry and other tricks
 - GEANT4 vs EGS5 vs Mars15 comparisons (David)

- ACD
 - Min/Max collection efficiency in MC
 - Improved digitization
- Bari digitization algorithm
- CAL cristal segmentation (Philippe)
- TKR Alignment : bug fixed, are we fine ? (leon)

Others

- TKR Hits and Clusters
 - For all kind of particles but in particular : EM showers and mips
 - TKR Hit deficit evaluation after data reprocessing (Nicola)
 - There used to be a difference of behaviour between PS and SPS : we know now it was due to using CO2 in the Cerenkov
 - Cluster Size
- CAL EM Shower
 - Longitudinal and Transverse shower profiles
 - Number of logs hit
 - gaps scan
 - Cerenkov pressure scan and scaled energy (Philippe)
- Tagger: PSF measurement with smaller error bars ?
- ACD : backplash measurement (Luis)
- Many pion studies (Berrie)
- Beam spot: Tuning, Gaps and Fiducial cuts
- Very high level reconstruction variables : Tkr1CoreHC, CalTransRms...

Background study runs

- Positron annihilation in MMS
- Gamma-background produced in MMS by protons (Alex)
- Albedo runs

Other topics/ideas/comments

things we did

- Selection of beam test-like events from orbits data
- Agreement Matrix and BtSysTest
- Material Audit : TKR and CAL, possible improvements

Some comments (luca)

Talk should have a list of

- understood (i.e. reproduced)
 - angular resolution (tagged+FB+electrons)
 - energy resolution (spread and tails, not average value)
 - backplash: are we happy with current strong cuts to reproduce that in MC?
 - trigger efficiency (do we have CAL-LE and CAL-HE plots similar to what nicola made for TKR? CNO efficiency? important for effective area)
 - general g4 behaviour and implementation (comparison with other simulators, beam line simulation)
 - CAL calibration (xtalk, non-linearities) - BUT how is SPS cross-calibration compatible with the GSI calibration and how do we calibrate in flight?
 - Material audit (TKR+CAL): how much more X0 do we expect from modifications to CAL geometry?
 - effects of material along beam line, i.e. no coherent improvement on both TKR and CAL discrepancies
 - effects of LE physics list and range cuts
 - optimized (but not perfect) hadronic physics list
- NOT understood
 - hit deficit in MC (and clusters)
 - log deficit in MC and overall raw energy scale
- plans to assess
 - effects of discrepancies on background rejection (data-like simulations, we MUST devise and show a plan here, we have been talking about this for too long now)
 - how do we play with shower shape in g4?