EMCal Offline Status

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Geometry

- End of last year a correction in the geometry was implemented, to use this correction it is necessary to add to the geometry name "V1"
- Geometry Names:
 - "EMCAL_FIRSTYEARV1": 2010 runs, 4 SM
 - "EMCAL_COMPLETEV1": >=2011 runs, 10 SM
- Config file must be modified each time -> Error prone
 - Several MC anchored productions have wrong geometry name
- Code modified so that the proper geometry is automatically instantiated given a run number
 - Not very nice, hardcoded the run range where to use one name or the other.
 - Check how to do it from the geometry information stored in the GRP
- A similar check should be done for the alignment matrices
 - We need the raw matrices and not the ideal ones, real detector displaced several cm
 - Several recent MC productions have wrong alignment matrices





2011 Calibration

- EMCAL only triggered runs in period LHC10b/c used for final calibration
- π^0 peak per channel calibration, like for 2010 data
 - We got similar (even better) calibration than last year.
- Channels behind frames, specially TRD region, cannot be calibrated, pi0 peak not visible at all.
- Use MIPs to try to calibrate such channels (need Tracks)



Other calibrations

- Run dependent energy calibration
 - Temperature variations change the gain of the ADC channel.
 - LED events fired in all runs help to get a correction factor per run
 - Automatic procedure not yet in place: CPass0, online DA?
 - For 2010 runs, we extracted the run by run variations and used them in private analysis, not done yet for 2011
- Timing calibration: Procedure under development
 - Align with respect a reference run
 - Produce a map with the average time per channel in the reference run.
 - Use the map to correct other runs.
 - Complications: Bunch crossing

07/03/2011

Add place holder for time calibration factors and use it in reconstruction





Detector performance in simulation

- Task 2627 : Correct detector response, GEANT and FLUKA. Simulation does not fully reproduce :
 - Non linearity
 - Need to calculate different non linearity in data and MC
 - Energy resolution
 - Gaussian smearing of 0.07xE^{1/2} at analysis level does the job, not nice
- Under investigation what ingredients are missing
 - Add extra fluctuations due to electronics other stuff
- B=0 vs B!=0
 - π⁰ spectra in data with field smaller than with PHOS and conversion photons due to efficiency calculation with simulations. With B=0, spectra match well.
 - Ratio of # of π^0 with and without field, different in simulation and data
 - Is the material budget in front of EMCAL correct?

 Check ongoing : approximately calculate distance to conversion vertex with data and compare with MC 07/03/2011



Track Matching

Task 2632: Track matching improvement : Finished task

- Now, during reconstruction (data and simulation), we have a reasonable amount of matches
 - 3 cm resolution in z direction and 6 cm in x-y plane (cell size) (no cut on energy, improves with energy)
- Due to insufficient energy loss due to material in front of EMCAL matching with electrons does not work so well yet



Raw fitting

- We have implemented different fitters,
 - Slow fitter, used until now in reconstruction: TMinuit fits
 - Fast Fitters
 - kFastFit, kNeuralNet, kPeakFinder, kCrude (Takes the maximum time bin)
- Frame handling the fitters fully redesigned (P. T. Hille)
 - More modular, clean up.
 - Need to correct the hardcoded values that are stored in OCDB
- We are doing benchmarking tests with the last summer beam test data.
 - kFastFit show same results as kStandard in terms of energy but fitted time has some problems.
- Need still to implement a cut based on the quality of the fit





Digits/Sdigits - Clusterization

- Task 2537: Verification of event merging procedures;
- Task 2538: Correct treatment of detector signal in sdigits correct event merging implementation
 - Simulated event merging works but not data embedding
 - For data embedding, we need to produce sdigits from raw
 - Calorimeters only produce sdigits, implementation could be done
- Clusterizers available:
 - V1 + Unfolding
 - NxN (3x3)
 - V2: NEW (C. Loizides), V1 plus cluster splitting depending on energy ordering
 - It showed good performance in PbPb data, similar to NxN





Back-up





Calibration: Run dependent corrections



- No analysis cuts, just avoid borders.
- Best calibration used.
- NO run dependent corrections applied.

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Calibration: Run dependent corrections



- No analysis cuts, just avoid borders.
- Best calibration used.
- WITH run dependent corrections applied.

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Detector response: Non linearity

- No non linearity correction is applied yet during the reconstruction.
- Simulation and Data show a different non linearity.
 - Need to understand origin of discrepancy.
 - Now we have 2 corrections one for MC and other from data (close to final).
 - Data correction must be extracted from beam test ... but there was material between electron beam and prototype ... not straightforward.







Calibration: Channel by channel relative time calibration



BC%4=0[4]





Improved time resolution

