

# Analysis tasks

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# Aims for today

- 1 Review the reconstruction/analysis tools.
- 1 Identify what we need.
- 1 Identify gaps.
- 1 Attach names to topics. Discuss timescales.
- 1 List main analysis topics.
- 1 Start attaching names to topics (probably not quite so urgent)
- 1 Topics not all equal in size; some may involve several people and need internal coordination.

# Objectives

- 1 Valencia (November 2006) – basic plots to show detectors working, data taken etc. No quantitative results.
- 1 Vienna (February 2007) – mainly technical, but a good chance to show some progress
- 1 LCWS Hamburg (June 2007) – aim to show comprehensive analysis of CERN'06 test beam data – detector performance; validation of Monte Carlo. Electron analysis could be close to final? Hadron analysis will probably be less complete.

# Tools: Beam Line reconstruction

- 1 Each of these items should consist of one or a few, Marlin processors.
  - 1 Drift chamber calibration (drift velocity, position) *[M.Faucci-Gianelli]*
  - 1 Track reconstruction and extrapolation using drift chambers. *[M.Faucci-Gianelli]*
  - 1 Use of Cerenkov counters for particle ID *[F.Salvatore, Beni Lutz, Manqui Ruan]*

# Tools: ECAL hit reconstruction

- 1 By reconstruction, we mean conversion of raw data to calibrated LCIO calorimeter hits, suitable for comparison with Mokka.
- 1 Each of these items should consist of one, or a few, Marlin processors.
  - 1 Calibration, using muon data [*Götz Gaycken (→???)*]
  - 1 Pedestal subtraction, gain correction and zero suppression. [*Götz Gaycken (→???)*]
  - 1 Data quality. Processors to flag/remove unreliable (e.g. noisy) data. [*Manqui Ruan + ...*]
  - 1 Digitization processor(s) to simulate random/correlated noise, crosstalk, dead cells etc. [*Anne-Marie Magnan ...*]

# Tools: AHCAL hit reconstruction

- 1 Each of these items should consist of one, or a few, Marlin processors.
  - 1 Calibration, using muon data *[Niels Meyer]*
  - 1 SiPM nonlinearity correction *[Niels Meyer]*
  - 1 AHCAL data quality. Processors to flag/remove unreliable (e.g. noisy) data. *[Sebastian Schmidt]*
  - 1 Digitization processor(s) to simulate random/correlated noise, crosstalk, dead cells etc.

# Tools: TCMT reconstruction

- 1 Each of these items should consist of one, or a few, Marlin processors.
  - 1 TCMT calibration using muons [*Guilherme Lima*]
  - 1 SiPM nonlinearity correction [*G.Lima*]
  - 1 TCMT data quality. Processors to flag/remove unreliable (e.g. noisy) data.
  - 1 Digitization processor(s) to simulate random/correlated noise, crosstalk, dead cells etc. [*G.Lima*]

# Tools: Miscellaneous

- 1 Flagging + documenting good quality data runs for analysis. Recording problems. [*Erika, Vasiliy*]
- 1 Alignment between detectors [*Valeria Bartsch*].
- 1 Identification of clean single electron samples using Cerenkov, shower properties etc. Dependent on beam conditions (CERN, DESY etc.)
- 1 Identification of clean pion (and other hadrons?) samples, and muons.
- 1 Reconstruction production [*Roman Poeschl*]
- 1 Run analysis (Marlin) jobs on the Grid.



# Analysis: ECAL specific topics

- 1 Energy response and resolution vs. energy for electrons. *[DRW, V.Bartsch]*
- 1 Energy response and resolution vs. angle for electrons. *.[Valeria Bartsch, Laurent Morin]*
- 1 Position and angular resolution for electrons. *[Anne-Marie Magnan]*
- 1 Energy response and resolution vs. position for electrons (gaps; uniformity) *[Laurent Morin].*
- 1 Transverse and longitudinal shower shape. *[F.Salvatore, Laurent Morin]*
- 1 Comparison with Mokka for all the above. Tuning if needed. *.[DRW...]*
- 1 Long term stability of response/resolution.
- 1 Time dependence of gain, pedestals, noise.
- 1 Temperature dependence of gain, pedestals, noise.

# Analysis: AHCAL specific topics

- 1 AHCAL response for electrons and hadrons.
- 1 AHCAL longitudinal and transverse shower profile.
- 1 Long term stability of response/resolution.
- 1 Time dependence of gain, pedestals, noise.
- 1 Temperature dependence of gain, pedestals, noise.

# Analysis: Combined topics

- 1 Energy response and resolution vs. energy for hadrons.
- 1 Energy response and resolution vs. angle for hadrons.
- 1 Position and angular resolution for hadrons.
- 1 Energy response and resolution vs. position for hadrons (gaps; uniformity).
- 1 Transverse and longitudinal shower shape.
- 1 Leakage from ECAL to HCAL for electrons
- 1 Leakage from HCAL to TCMT for hadrons.
- 1 “Deep analysis” of shower substructure [*Vasiliy*]
- 1 Particle separation (e/hadron) using calorimeter
- 1 Comparison with Mokka for all the above for various hadronic models.

# Monte Carlo (Mokka)

- 1 Overall coordination of test beam simulation in Mokka  
*[Gabriel Musat]*
- 1 Beam line detectors *[Fabrizio Salvatore]*
- 1 ECAL geometry *[Götz Gaycken (→???) , Gabriel Musat]*
- 1 AHCAL geometry *[Oliver Wendt]*
- 1 DHCAL geometry *[???*]
- 1 TCMT geometry *[Guilherme Lima]*
- 1 Interface with FLUGG (Fluka) ? *[Nige Watson]*
- 1 Monte Carlo set up and production on the Grid *[Dave Bailey, Fabrizio Salvatore, Nige Watson ...]*
- 1 Ultimately apply MC digitization in a standard way for everyone?

# How to proceed?

- 1 Suggest groups discuss and send Nige/David names and topics they will work on, by **Thursday 2 November**
- 1 We will then liaise to try to eliminate overlaps and plug gaps.
- 1 Regular phone meetings (4-weekly?). Informal; review progress; present work and problems at an early stage so as to pool expertise. More frequent if needed.
- 1 Face to face analysis meeting at DESY in February?
- 1 Next meeting: propose Thursday 23 November at 15:00 (UK) 16:00 (CET) 09:00 (mid-west)