Software activities of the e/γ and Jet/E_T^{miss} WG

For Jet, E_T^{miss} and e/γ,

briefly review the status of

- Reconstruction
  - Status of Algorithms
  - Development of New Code
- Simulation

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See: reconstruction page (D.Rousseau)

Reconstruction plan

http://atlas.web.cern.ch/Atlas/GROUPS/SOFTWARE/OO/domains/Reconstruction/plan/plan.html

Entity list

http://atlas.web.cern.ch/Atlas/GROUPS/SOFTWARE/OO/domains/Reconstruction/entities/entities.html

Software activities of the e/γ and Jet/E_T^{miss} WG

Basic steps of Jet reconstruction:

- Preparation of input:

  list of calibrated (EM scale) cells, towers, clusters)
- Jet Finding (Jet Finder Library)
- Jet Energy Calibration

  Experimental aspects:

  calorimeter non-compensation, dead material, etc.

  Physics aspects:

  from jet to parton
- Jet identification (b-jet, τ-jet, etc.)

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- Preparation of input:

comes from Lar and TileCal systems:

C++ code available in Paso & "Gaudi" framework

See talks of Srini (Lar) and Ambreesh (Tile)

Both groups agreed to use common classes

For "cells", "towers", "clusters"

Software activities of the e/γ and Jet/E_T^{miss} WG

– Jet Finding:

On-going activities:

- First step towards jet finding (Ambreesh)

  Version of k_T algorithm implemented using input from tower energies

  Comparison with "old software" foreseen with help of P.Camarena

- Sliding Window algorithm (implemented by Srini for EM cluster reconstruction) is also a jet algorithm

Starting activities:

- Jet finder library: M.Wielers & co (Triumf) interested in working on a C++ version of jet finder library. Translate existing ATLAS fortran library, use exisiting C++ libraries like CMS's.

→ Time seems to be wripe for a discussion on the "framework" :

- Critical review of input, out put, requirements, use-cases, jet class, etc...
- work organisation among developers

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– Jet Energy Calibration:

Status of algorithms:

Various algorithms, correcting for experimental effects, have been developed in the old code but work is still ongoing

- "Benchmark algorithm" and "H1 weighting"
  full eta and energy dependent parametrisation, different luminosity conditions ...
- "Energy flow" combining charged tracks + calo info – to be developed from scratch

Status of new code:

Need volunteers to work on it !

"Old code" developers available to check performances (P.Camarema, C.Santoni ...)

– Jet Identification:

For b-tagging, see corresponding WG report

For tau-jet (3-prong, one-prong decay):

Status of algorithms:

Algorithms to construct the quantities used for identification exist

Status of new code:

Need volunteers to work on it !

"Old code" developers available to check performances (D.Cavalli)

Software activities of the e/γ and Jet/E_T^{miss} WG

Basic steps of E_T^{miss} reconstruction:

- Preparation of input:

  list of calibrated (EM scale) cells

  same as for jet case

- E_T^{miss} reconstruction:

Status of algorithms:

Algorithms exist, some developement still needed at high luminosity

Status of new code:

Need volunteers to work on it !

"Old code" developers available to check performances (D.Cavalli)

Software activities of the e/γ and Jet/E_T^{miss} WG

Basic steps of e/γ identification:

- Preparation of input:

  in the hands of the systems: list of calibrated cells and clusters from Calo;

  list of tracks, Bremsstrahlung recovery code and γ-conversion finding from ID

  ... Being implemented ... Available in september

- e/γ identification:

Status of algorithms:

- Algorithms to identify electrons with (without) Bremsstrahlung and (non-) converted photons exist.
- Requirements for the ID code (modular and flexible Bremsstrahlung recovery code; converion finding with high and well understood efficiency)
- Need to extend and optimize the discrete identification algorithms from the TDR to a broader energy range and build probability based algorithms

Status of new code:

People involved in the TDR analysis have been contacted to participate in the new software effort: Pascal Pralavorio, J.Schwindling, Monika Wielers

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Implementation of physics calibration procedures:

- Electromagnetic calorimetry:

  J/Ψ and Z→ee, E/p : set of use-cases provided.

  As the new software becomes available, more detailed discussion on implementation and functionnality will take place.

- Hadronic calorimetry:

  Z0+jet, W→jetjet, E/p from isolated charged pions: at the stage of developing algorithms

Montecarlo simulation:

- Geant4 simulation:
  - Followed-up in the LAr and Tile systems: test beam and ATLAS set-up, ...
  - G4 physics validation (see K. Amako's talk)
  - Subject followed-up in the combined groups
- Shower parameterisation:
  - Starting effort, volunteers to work on that subject are needed !
  - Work done for trigger simulation being implemented in Atlfast

Software activities of the e/γ and Jet/E_T^{miss} WG

Emphasis of the talk was on the implementation of the algorithms in the new framework

There are other aspects of the group activities:

- Physics studies, often performed in the context of physics groups
- Work done with the age/fortran implemented algorithms is documented in the TDR

  Some examples:

  e/jet, γ/jet separation, γγ inv. mass resolution, jet and E_T^{miss} resolution, reconstruction of resonances decaying to jets and tau's, etc…
- Some of these will serve as benchmark studies to be reproduced for the physics workshop next year with the new software

  Keep timescale in mind ! Manpower for developing the tools is needed !
- New studies will take place as much as possible already with the new code