ARTEMIS : PLANS FOR WP1

1. TRIGGER PERFORMANCE –WP1a

2. ELECTRON/MUON RECONSTRUCTION AND PERFORMANCE – WP1b

TASK: CTB04 electron paper

Artemis members actively contributing to the CTB paper:

- Calibration-Linearity-Resolution for electrons from 9-250GeV.
- Photon energy scale.
- Validation of shower shape variables with data (e-ID).
- Validation of Geant 4.8 and later with data.

TASK : efficiencies and Rejections using MC

By the end of 2007 we will have to study efficiencies and fake rates for the H→4l backgrounds in collaboration with the ATLAS performance groups.

- Electrons: 1 set of cuts will be used (Calo isolation) and their corresponding efficiency vs fake/purity curves vs eta and pt. The CTB data will provide the first check of the MC in terms of shower shape variables. The Artemis groups are leading this effort. Curves should be extracted with the CSC samples. We already have contributions for CSC performance notes and the ATLAS detector paper.
- Low pt electrons: we will have to understand the optimum cuts for pt<20GeV. The idea is to keep efficiency constant and Rejection high. The R vs pt will have to decrease at low pt but it must be under control.
    - Define jet samples (Z+j, Z+jj, Dijets)
    - Define the procedure of obtaining Rejection
    - Develop a tool to obtain Efficiency/Rejection (cut-by-cut).
    - Obtain Jet Rejection using different samples.
    - Obtain e Efficiency for single e, H→4e, H→2e*2mu ,H→2e2mu* with and without pileup.
    - Explore the combination of Calo vs ID cuts for Jet rejection: they are highly correlated but they have different sensitivity to systematics.
- Muons: Efficiency and fakes vs pt, eta, phi and isolation criteria. These plots have already presented in 2 summer conferences by Artemis colleagues.
- Low pt muons: Very useful for low mass Higgs optimisation (mH~120 GeV)
- Tracking/Vertexing: members are developing vertexing tools to be used at the AOD level and provide discriminants for the 4-lepton background rejection. They also provide reconstruction of the pile-up vertices. This work has been presented in ICHEP07 conference by Artemis members.

TASK: Background Studies with MC

- ZZ* and ZZ: the ZZ measurement proposed by Thessaloniki probably requires different sets of cuts than in the H→4l analysis. However differences in the kinematics between the ZZ background and the ZZ from the Higgs must be explored with MC.

- Zbb/Zcc: we are concerned with the two leptons from the b quarks faking a Z*. This is only a serious background for low mass Higgs:
    - b,c→e,mu isolation studies
    - b,c→e,mu impact parameter studies
    - Zbb→4l vertexing studies (all 4 leptons together).
- ttbar: study rejection with simulated samples
- 2l2taus: study rejection with simulated samples

TASK: Background Studies with first Data

- ZZ* and ZZ: Develop a method to measure the background from data (WP2)
- Zbb: we need to study in general:
    - Develop a method to measure the background from data (WP2)
    - B→leptons: tag Bs study Rejection
    - Z+j with first data: study j→l fakes (back to back with Z)
    - Z+jj with first data: study jj→dilepton (Z*) fakes.
    - Dijets: study 1,2,3,4 lepton event yields with first data. Compare to MC
- ttbar:
    - Identify ttbar+jets where the ttbar→2leptons, study Rejection.
    - Study the possibility to measure ttbar+jets→4l with the first data (WP2)

TASK: EM calibration for LAr Barrel and Endcap

- Extract the calibration constants for the LAr Calorimeter from simulation.
- Study methods to extract the calibration constants with the first data using isolated electrons.

Milestone	Deadline	Status	People
Extraction of EM Calibration constants : Fixed Windows, Topol Clusters	10/2007	Done 12.0.X	SHEF
Electron Efficiency/Jet Rejection	12/2007	In Progress	SHEF,AUTH
Electron Low pt studies (Effic/Rejection)	12/2007	In Progress	TBD
Extraction of EM Calibration in CTB	9/2007	Done	SHEF
Electron Shower/ID Isolation Cut Reoptimization	12/2007	In Progress	SHEF
Muon Isolation cut optimisation	12/2007	In Progress	Saclay AUTH
Muon-id algorithm studies	12/2007	In Progress	Saclay AUTH
Develop vertexing tools at the AOD level for H→4l analysis	6/2008	In Progress	SHEF
Develop method to measure the Zbb background with 1fb-1 luminosity	6/2008	In Progress	Saclay SHEF AUTH
Study b→e rejection	12/2007	In Progress	As above
Study c→e rejection	12/2007	In Progress	As above
Validation of G4.8 with data	12/2007	In Progress	As above
Develop electron/muon performance tools which run automatically every night and provide physics validation.	9/2007	Done	SHEF, Saclay
Recalibration/Intercalibration of EM Calo using Z/W→e	6/2008	In Progress	Saclay, SHEF

3. Jet RECONSTRUCTION AND PERFORMANCE – WP1b

Institutes interested in contributing to WP1b are: UCL (jet perf for WW scattering), Sheffield (dijet in-situ, fragmentation studies), Pisa (VBF Higgs; QCD cross section), Max Planck (ttbar, VBF Higgs)

- CTB04 paper.
  - Linearity, resolution, shower shape and comparison with G4 predictions for
    - H8 low energy data (1 - 10 GeV)
    - H8 high energy data (20 – 350 GeV)
    - H6
- Jet Performance assessment using MC information:
  - linearity, resolution, tails, jet shapes ... for various eta/pt ranges
  - track information for jets (M.Hodkingson)
  - efficiencies for various eta/pt ranges (pt>20GeV for ttH) (
  - forward jet tagging performances for pt>40GeV (for VBF, WW scattering) (Max Planck)
  - Low pT jet veto (VBF)
  - Subjet analysis, single-jet mass (WW scattering)
- Validation of Jet reconstruction and calibration using first in-situ data
  - Define quality cuts for events and for jets
  - E/p
  - fragmentation studies (Sheffield)
  - uniformity using di-jet balance (Hodgson)
  - invariant mass studies with W $\rightarrow$ jj decays
- Use of W $\rightarrow$ jj to extract energy scale, linearity and resolution

Milestone	Deadline	Status	People
CSC note on comparison Data/MC for CTB data – H6	10/2007	In progress	Max Plank Institute
CSC note on comparison CTB results – H8	10/2007	In progress	V.Giangiobbe, I.Vivarelli, V.Cavasinni, C.Roda
Extraction of Had Calibration constants	10/2007	In Prog for rel	
H1 with jet energy dependence		13.0.x	I.Vivarelli
Local Hadron Calibration		13.0.x	S.Menke
Assesment of jet performance and implementation of jet performance package using MC info	10/2007	In Progress	V.Giangiobbe
Validation of jet performances with in-situ events	10/2008	In Progress	Hodgson
Measurement of energy scale, linearity and resolution using W$\rightarrow$ jj events	12/2008	?	?