



Plans for E_T^{miss} and jet energy recalibration study with an imperfect calorimeter

**ATLAS Hadronic Calibration
Workshop**

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MPI

**D.Axen (UBC), Y.Ishizawa (TRIUMF),
R.McPherson(UVic/IPP), I.Trigger (TRIUMF),
K.Voss (UVic)**



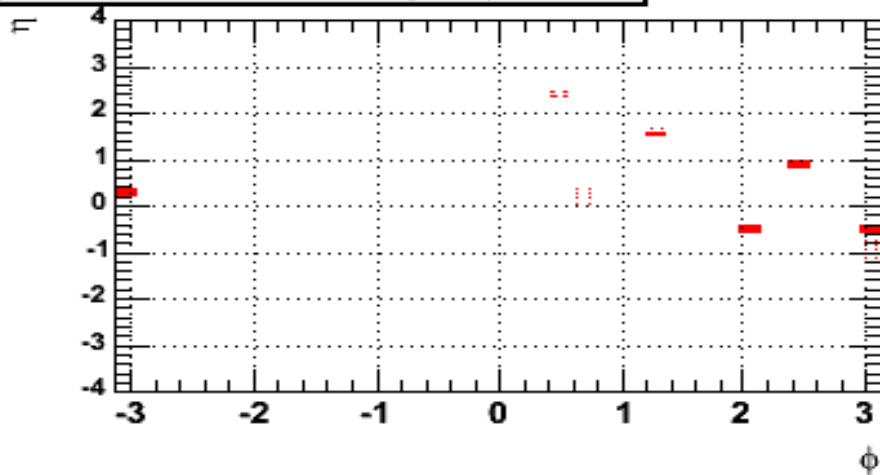
- ◆ Goal is to demonstrate hadronic analyses robust against detector problems
- ◆ Kai has written a cell-killer tool that lets us generate “mock data” with parts of the calorimeter not working
 - ◆ ⇒ mock data will not be exactly same as data, but should have similar features dictated by the hardware
- ◆ This runs on RDO (not ESD) so you have to re-do full reco (slow)
 - ◆ Problem is the “allcalo” CaloCellContainer which one would need to read from ESD file, process, and write to new file
- ◆ General idea is to run Yoshio's validation suite on some Z+jet events, re-reconstruct the events with Kai's cell-killer, re-run validation, compare...
- ◆ Z+jet validation suite is documented in note attached to agenda

Current default cells killed

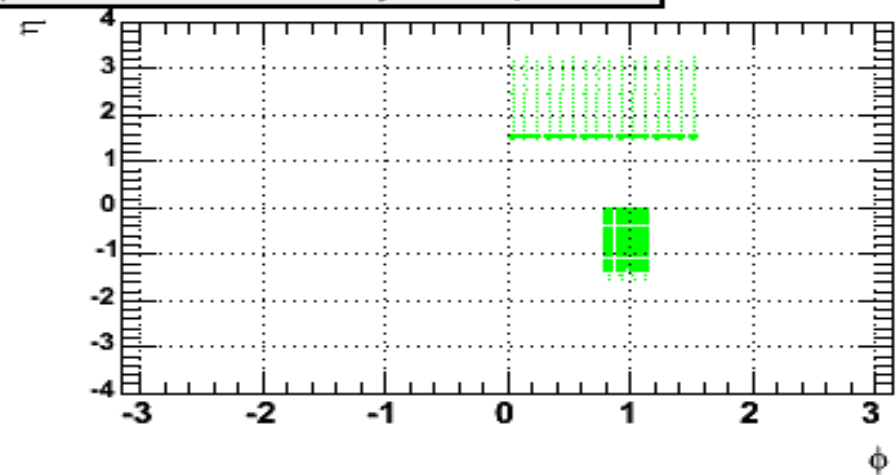


- ◆ 9 LAr HV lines: 224 cells @ 0, 9722 @ $\frac{1}{2}$
- ◆ 2 LAr FEC (1 EMB, 1 EC special): 7680 dead cells
- ◆ 2 Tile drawers: 41 dead cells

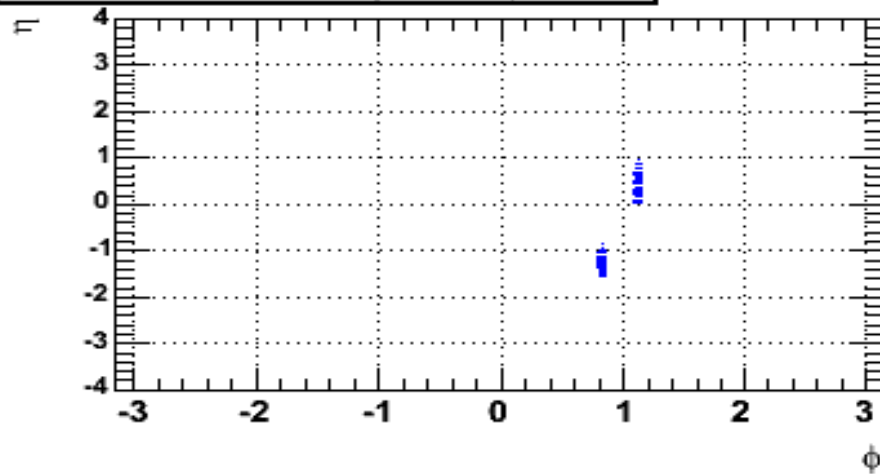
position of LAr cells killed by HV problems



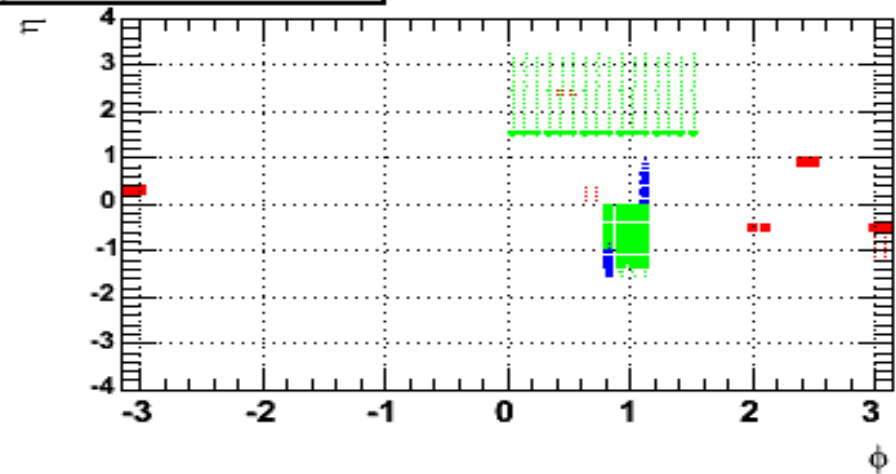
position of LAr cells killed by readout problems



position of Tile cells killed by readout problems



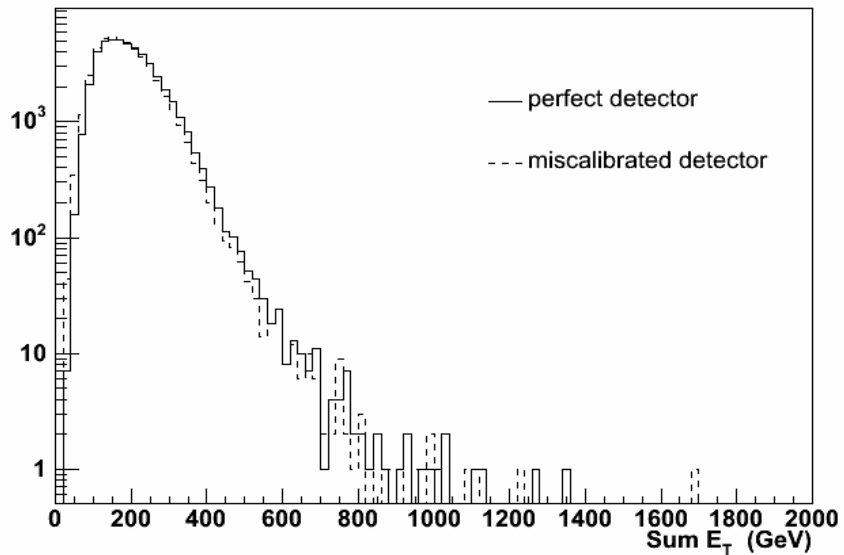
position of all killed cells



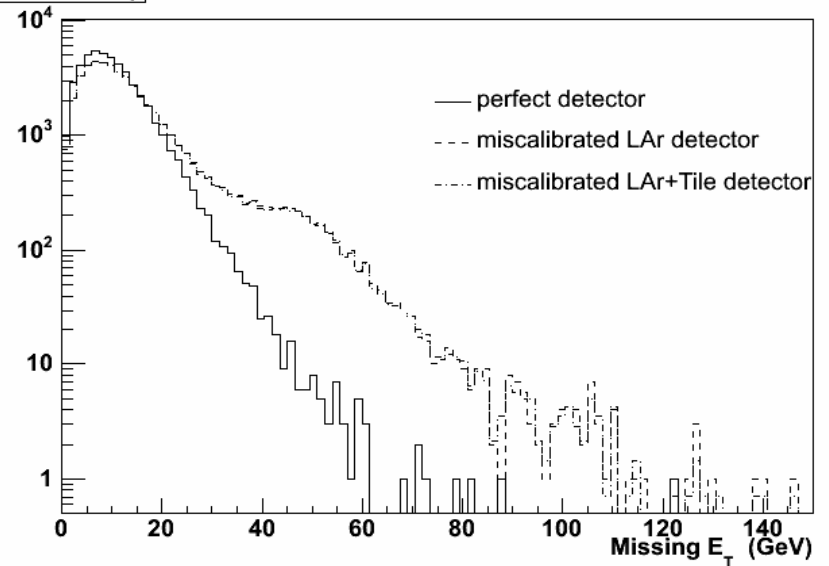
Effect on $Z(\rightarrow ee) + \text{jet}$



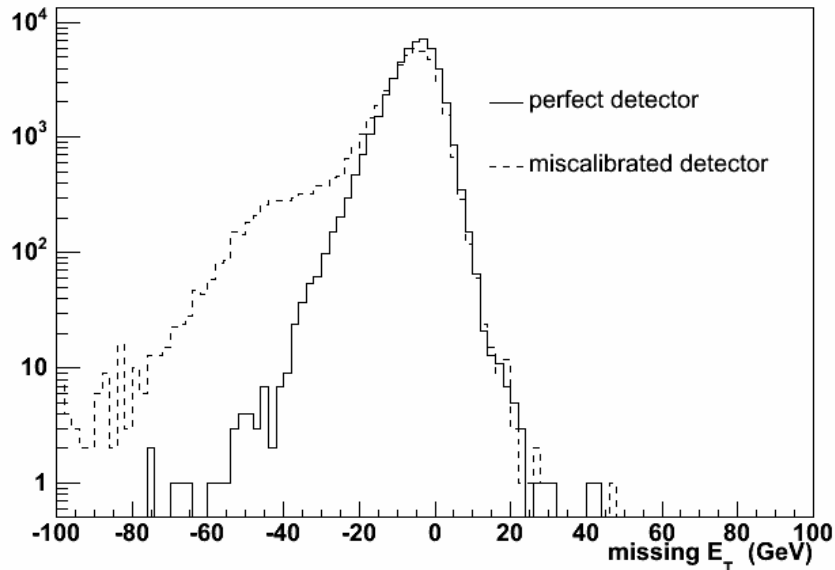
Sum E_T



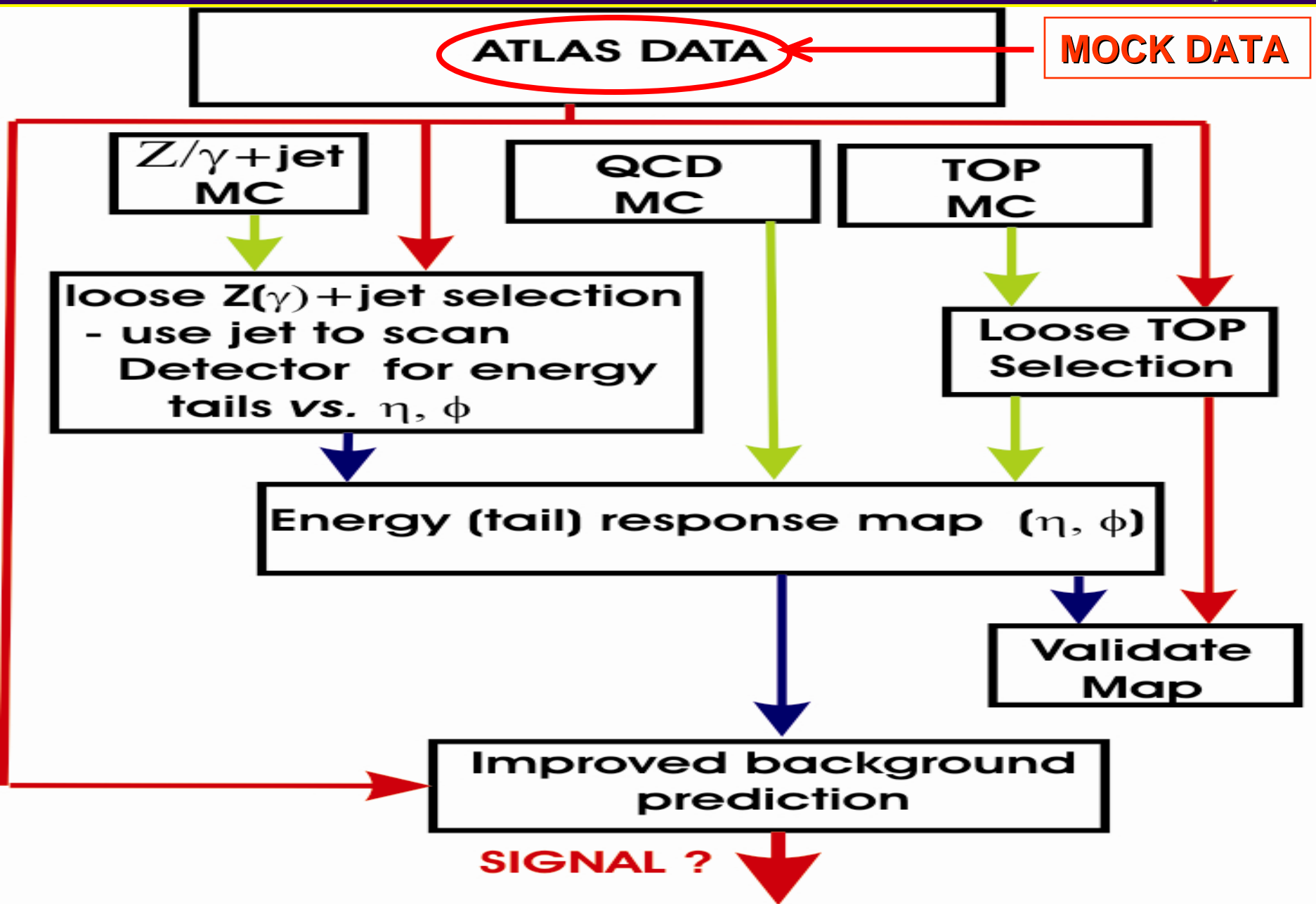
Missing E_T



$E_T^{\text{true}} - E_T^{\text{reco}}$



Sketch of "Robust" analysis





- ◆ Using RDO files. Have started with Z+jet with $Z \rightarrow ee$ or $Z \rightarrow \mu\mu$
 - ◆ Pythia, ZmumuJimmy / ZeeJimmy samples
 - ◆ Will also do some QCD, tt, a SUSY benchmark point
- ◆ Run standard reco to create test samples of ESD/AOD
 - ◆ Validating against official AOD production
- ◆ Run reco with “cell-killer” job-options to create AOD for detector with some electronics problems



- ◆ Reconstruct Z+jet with a simple EventView-based analysis
 - ◆ looking at jet and lepton η , φ , p_T , E_T^{miss} distributions
 - ◆ understand features which seem anomalous, discovered (mostly known) bugs, ...
 - ◆ Using p_T -balance between reconstructed Z and jet and see how it depends on η , φ , jet p_T , jet energy etc.
 - ◆ Matching to initial parton
 - ◆ same for E_t^{miss} projection in Z-direction
 - ◆ \Rightarrow Analysis is described in note attached to this agenda page



- ◆ Run validation suite on cell-killer AOD mock-data
- ◆ Compare validation results with perfect and imperfect detectors
- ◆ Can jet energy calibration be corrected for detector imperfections so that understanding of physics E_T^{miss} is recovered?
 - ◆ At what level must correction be done? clusters? jets?
- ◆ Also wonder if this should be coordinated with “crack” studies ...



Backup Slides

More information for discussion...

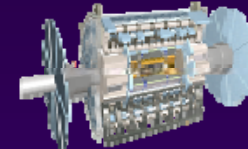


- ◆ Kai has written cell-killer, simple job options
- ◆ Yoshio has validation suite for kinematics of leptons, jets, missing E_T , p_T -balance, etc. in Z+jet
- ◆ Isabel has LCG / DQ2 tools set up at TRIUMF to do file imports, Athena 11.0.42 installed locally for reconstruction



◆ Very simple job options:

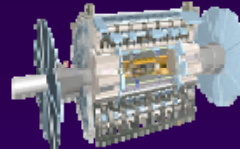
- ◆ `DetDescrVersion="ATLAS-DC3-02"`
- ◆ `EvtMax=100000`
- ◆ `PoolRDOInput=["/data/Simfiles/mc11.004202.ZmumuJimmy.digit.RDO.v11000401._00001.pool.root"]`
- ◆ `doCBNT = False`
- ◆ `doHist = False`
- ◆ `from ParticleEventAthenaPool.AODFlags import AODFlags`
- ◆ `AODFlags.Streaming = False`
- ◆ `PoolESDOutput =`
`"/data/Simfiles/mc11.004202.ZmumuJimmy.digit.RDO.v11004201._00001.myNotPerfectESD.pool.root"`
- ◆ `PoolAODOutput =`
`"/data/Simfiles/mc11.004202.ZmumuJimmy.digit.RDO.v11004201._00001.myNotPerfectAOD.pool.root"`
- ◆ `CollOutput =`
`"/data/Simfiles/mc11.004202.ZmumuJimmy.digit.RDO.v11004201._00001.pool.root.myNotPerfectTAG.root"`
- ◆ `include ("RecExCommon/RecExCommon_topOptions.py")`
- ◆ `include ("FakeProblems_jobOptions.py")`



- ◆ **Default contents of FakeProblems_jobOptions.py**
 - ◆ **CaloCellMaker.CaloCellMakerToolNames += ["CaloCellContainerCorrectorTool/FakeProblemsTool"]**
 - ◆ **ToolSvc.FakeProblemsTool.CellCorrectionToolNames = ["CaloCellWeightCorrection/LoopWeightTool"]**
 - ◆ **ToolSvc.LoopWeightTool.CellWeightToolNames = ["LArCellFakeProbHV/fakehv", "LArCellFakeProbElectronics/fakeEle", "TileCellFakeProb/faketile"]**
 - ◆ **ToolSvc.FakeProblemsTool.CaloNums = [SUBCALO.NSUBCALO]**
 - ◆ **ToolSvc.fakehv.DeadHVs=["3 1 48 1 0", "3 1 50 1 0", "3 1 6 10 0", "3 1 44 4 0", "3 1 2 2 0", "3 2 2 2 0", "3 2 18 12 0", "1 1 24 2 0", "1 1 6 6 0"]**
 - ◆ **ToolSvc.fakeEle.Dead_FEC_FEB_CHAN=["0 0 10 999 13 0", "0 0 11 999 13 0", "1 1 2 999 9 0", "1 1 3 999 1231 0"]**
 - ◆ **ToolSvc.faketile.DeadDrawerList=["0 11 0", "4 8 0"]**



- ◆ Use EventView to get standard reconstruction of e, μ , jet without overlaps
- ◆ For electron and muon, compare generator-level and reconstructed E_T , η , ϕ distributions
 - ◆ Strange discrepancy for many muons measured E in AOD is 3/2 p. Problem with material loss correction?
- ◆ Jet multiplicity, E_T , η , ϕ distributions
 - ◆ some curious peaks around $\eta=0$, $|\eta|=2.5$



- ◆ Look at efficiency of jet-parton matching as function of E_T , η , ϕ
 - ◆ some curious bumps in η
- ◆ Calculate jet E_T resolution as function of generated E_T
 - ◆ preliminary results seem less good than expected, investigating