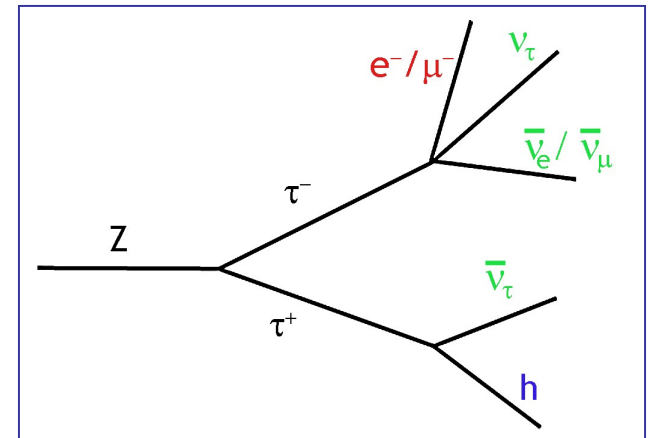


$Z \rightarrow \tau \tau \rightarrow \text{lepton-hadron}$   
in first data ( $1-100\text{pb}^{-1}$ ):



- detector understanding (instrumental effects on EtMiss!)
  - validation of SW for Tau and EtMiss reconstruction
  - select a high purity sample
  - determine the absolute energy scale of Tau and EtMiss
- 14 TeV analysis:
- Tau and EtMiss CSC Note (D. Cavalli/C. Pizio)  
ATL-COM-PHYS-2008-127 (D. Cavalli/C. Pizio)
- determination of  $\tau$ -jet efficiency from data
  - $\sigma(Z \rightarrow \tau \tau)$  measurement  $\rightarrow$  overall consistency/universality

## $Z \rightarrow \tau \tau$ in W/Z Benchmark package

The analysis developed in Milano, cross-checked by the Freiburg group, has been implemented in the W/Z Benchmark package (since July 2009)

- features/cuts from other analyses added (Pennsylvania and Cracow)

Having  $Z \rightarrow \tau \tau$  event selection in the W/Z Benchmark package has some advantages:

- Can use the common tools for the W/Z analyses, e.g. access results from Performance package, ele/mu efficiencies, info for cross section extraction, etc..

- Can use the analysis framework prepared to do that

- Can produce D3PD

→ Coherent results on cross-section evaluation for all lepton channels

- Package created to run with rel 14.5.1. Now updated to work with release 15 (can run also on data)

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# $Z \rightarrow \tau \tau$ results at 10 TeV



## ATLAS NOTE

ATL-COM-PHYS-2009-XXX

December 14, 2009



### A Selection Strategy for $Z \rightarrow \tau\tau \rightarrow \ell\tau_h$ with the First 100 $\text{pb}^{-1}$ from ATLAS

- Note in preparation  
(almost finished)
- Collaboration of  
many people/institutes

Donatella Cavalli<sup>1</sup>, Yann Coadou<sup>2</sup>, Will Davey<sup>3</sup>,  
Justin Griffiths<sup>4</sup>, Anna Kaczmarska<sup>5</sup>, Susanne Kuehn<sup>6</sup>,  
Stan Lai<sup>6</sup>, Wolfgang Mader<sup>7</sup>, Caterina Pizio<sup>1</sup>, Ryan D. Reece<sup>8</sup>,  
Elzbieta Richter-Was<sup>5</sup>, Soshi Tsuno<sup>9</sup>, H. H. Williams<sup>8</sup>

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<sup>2</sup> Organisation Européen Recherche Nucléaire (CERN)

<sup>3</sup> University of Melbourne

<sup>4</sup> University of Washington

<sup>5</sup> Henryk Niewodniczanski Inst. Nucl. Physics, PAN

<sup>6</sup> Albert-Ludwigs-Universität Freiburg

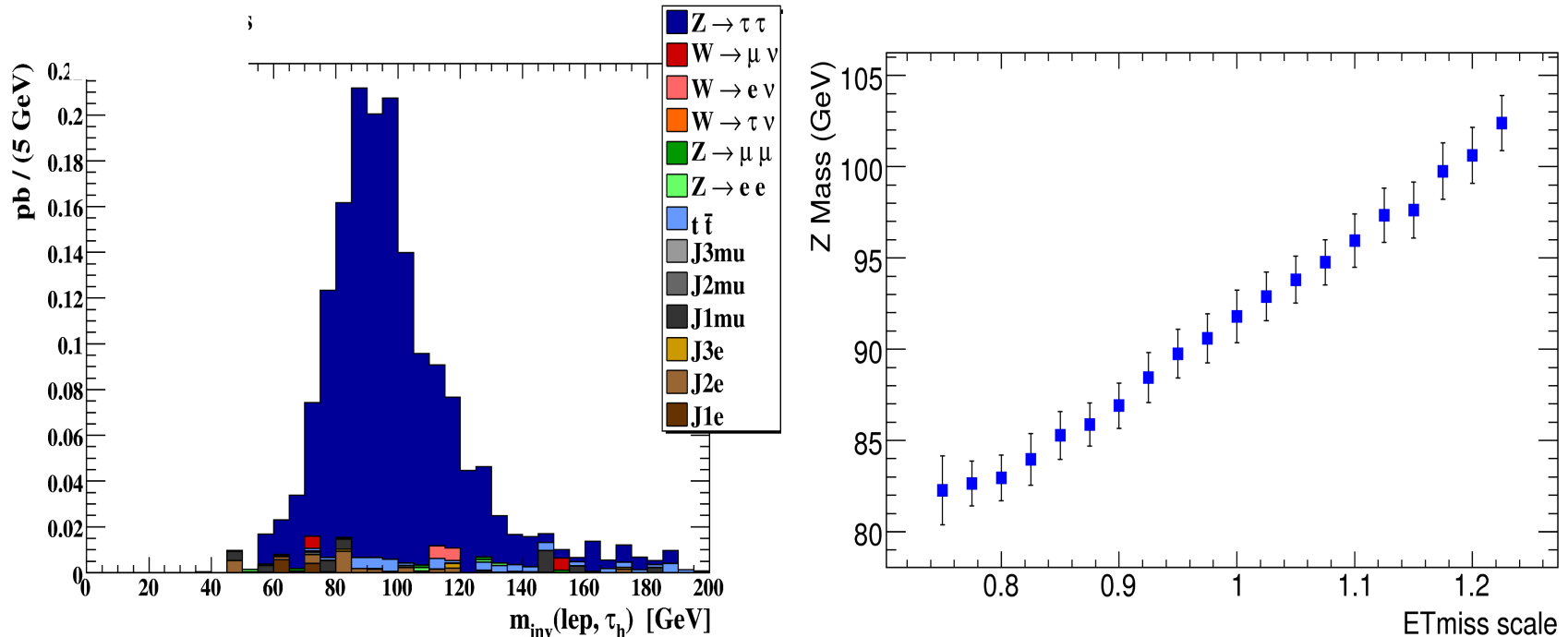
<sup>7</sup> Technische Universität Dresden

<sup>8</sup> University of Pennsylvania

<sup>9</sup> KEK, High Energy Accelerator Research Organization

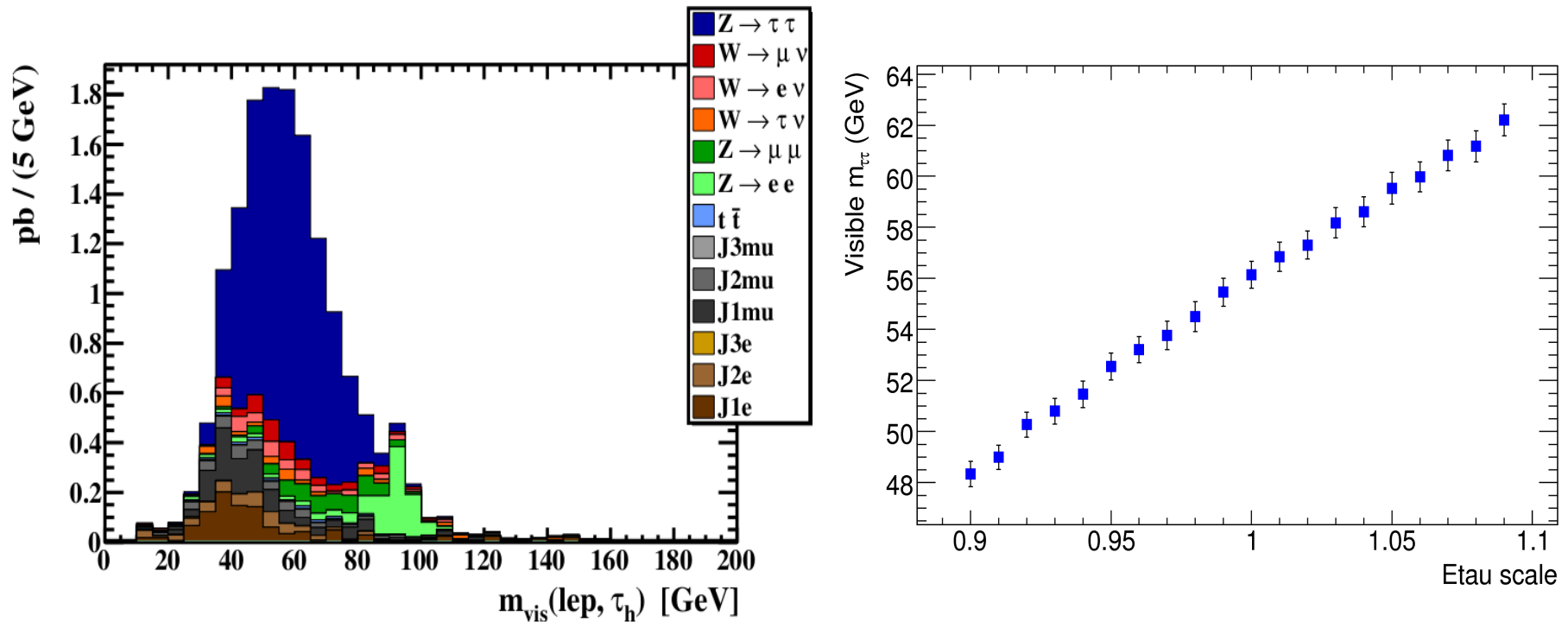
\* Editors and corresponding authors: email@cern.ch, email@cern.ch

# Invariant Mass results at 10 TeV



- About 150 signal events in 100 pb-1
- Very small bkg (<5%)
- QCD bkg studied using also AF2 samples → results confirmed
- Study of systematics on the scale measurement still to be completed

# Visible Mass results at 10 TeV



- Larger bkg  $\rightarrow$  background events subtraction needed  
(using SS events which are from background only)
  - ★ Stability of peak position after subtraction
- Need a reference value for visible mass from MC
  - ★ About 4% systematic uncertainty from MC prediction  $\rightarrow$  more studies needed

# $Z \rightarrow \tau \tau$ in first data: work plans

- MET in first data studied in Milan
- MET scale measurement: be ready to do the analysis, as soon as we have enough data (Caterina)
  - Work at the interface of Benchmark package with MissingETPerformance package: study MET in  $Z \rightarrow t\bar{t}$  events selected by Benchmark analysis
  - Complete the study of systematics errors for this measurement
- Tau-jet scale determination (Sofia)
  - Evaluation of QCD background from data, looking at Ntracks
  - Reference visible mass from MC
  - Start to look at jets and taus in data: compare with MC

More details in Caterina  
end year seminar  
on the 15<sup>th</sup> Jan 2010  
h. 11.00 Aula Caldirola