

# H->bb: Goals for Summer 2011



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HSG5 Workshop at JINR, Dubna, 10 May 2011

# Un-boosted WH analysis

- Cut-flow comparison between various groups
- First done in rel.15, re-done to check migration to rel.16
- Analysis cuts established and almost final (see below)
- Several ongoing studies to finalize analysis selection:

Task	Obs	People
Trigger: study optimal trigger for the 2011 data. Bear in mind that single-lepton triggers will likely increase to pT thresholds of $\approx 20$ GeV – i.e. analysis cuts will need to increase to $\approx 22$ GeV; check also any sculpting, angular acceptance, etc	Does this need AODs? Enough info on WZ/top <a href="#">D3PDs</a> ? Sample A or sample T should have the foreseen menus Liaise with Gemma Wooden	
Muon reconstruction: investigate different options		Jinlong Zhang
Electron reconstruction: investigate alternatives	Inclusion/exclusion of cracks Inner detector cuts (B layer?)	
Pileup: what do we need to do with 2011 pileup	Reweighting method. Jet vertex fraction. Choice of vertex reconstruction	Jike Wang
Jet energy scale: investigate size of systematic uncertainty	Worry about b jets. Any way to improve di-jet mass resolution? Liaise with <a href="#">JetETmiss</a>	Patricia Conde, Jose Maneira, Nuno Anjos
B tagging algorithms	Effect of each different choice on significance	Jinlong Zhang
Fast monitoring: implement WH baseline selection in online monitoring infrastructure	Example exists. Involves programming in Athena. Liaise with Fabien Tarrade.	Lianliang Ma
QCD background estimation from data		Michiel Sanders, Jonas Will
Wbb background estimation from data		
top background estimation from data		

# CONF note for EPS-HEP 2011

- Editors: Paul Thompson, Andrew Mehta, Patricia Conde-Muiño
- Title: *“Searches for a Higgs boson decaying to a b-quark pair with the ATLAS detector at the LHC”*
- Tight time scale – but feasible!
  - First **INT** note draft should be ready on 10 June
  - To be finished by the end of the month
  - Data frozen for EPS on 22 June – expect final calibrations etc
  - **CONF** note circulated early July to be approved before conference
  - Conference starts 21 July
- Notes:
  - Need this material for **H->bb poster** accepted at EPS-HEP
  - Could re-use the existing CDS number (ATL-COM-PHYS-2010-929)
  - Contacted members of old Winter “background” note ed.board to check availability before moving forward
  - SVN area for note  
[https://svn.cern.ch/repos/atlasgrp/Physics/Higgs/HSG5/data\\_7TeV/ATL\\_COM\\_PHYS\\_2010\\_929/trunk/](https://svn.cern.ch/repos/atlasgrp/Physics/Higgs/HSG5/data_7TeV/ATL_COM_PHYS_2010_929/trunk/)

# CONF Note

- Contents:
  - Title is generic to make sure we can adapt contents to time available
  - Should aim for a short **CONF** note – possibly a longer **INT** note
  - Un-boosted **WH** is the obvious candidate
  - From Wahid's talk, **boosted WH** does not seem a viable candidate in the available time (but I would be happy to be contradicted!)
  - Un-boosted **ZH** seems feasible and we should aim to include it
  - **ttH** clearly not for this note – but no reason to not expect it for end of the year
  - VBF H->bb may be in a longer timescale – let's see
- Analysis results:
  - Need  $m(b,b)$
  - Systematic errors – including JES (can start with an old recipe?)
  - Xsection limits?
  - Control plots (for INT note?)

# SM Higgs Combinations

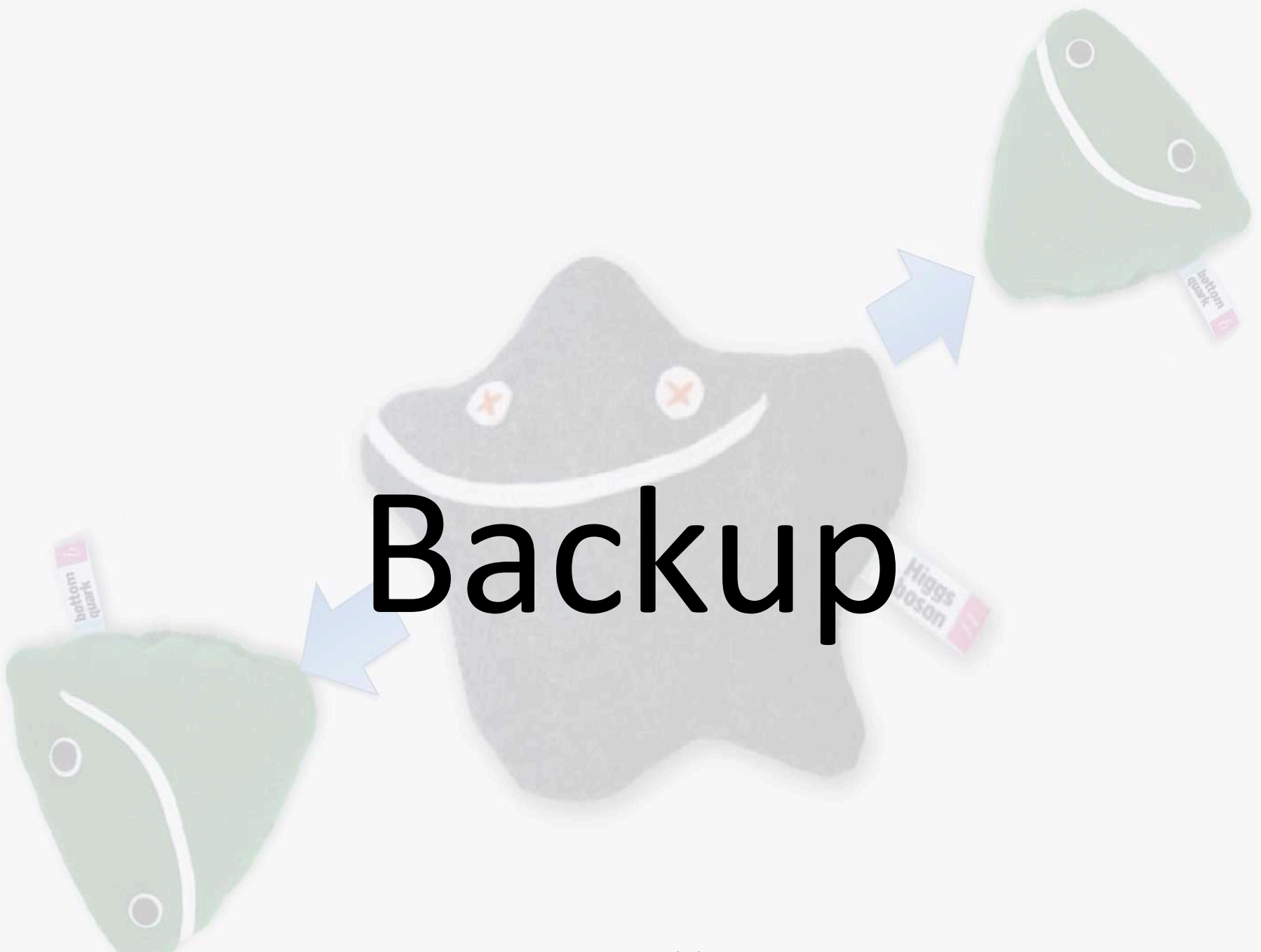
- Bill says we should contribute to the Atlas/CMS combination
- ... may be a bit soon – latest date for inputs is 19<sup>th</sup> June, I think
- Alternatively there may be an Atlas-only combination later
- Comments?

# The Master Plan

**TOP SECRET**

1. Get CONF note out for EPS
  - This will set the basis for later work
2. Contribute to ATLAS or LHC Higgs combination asap?
  - Need to discuss this
3. Plan for a paper at end of this year or early 2012
  - This must include remaining channels and boosted Higgs techniques

# Backup



# H->bb poster for EPS-HEP

## H->bb searches with the ATLAS detector at the LHC

The H -> bb channel is extremely important for the observation of a Higgs boson signal at the LHC. In the Standard Model, this channel would provide a significant contribution to the Higgs boson search in the low mass region, where this decay mode constitutes the dominant Higgs decay channel. Due to the enormous jet production cross-section at the LHC, the search must target channels where the Higgs boson is produced in association with a weak boson, a pair of top quarks, or jets separated by a rapidity gap. It also requires complex techniques to reconstruct the signal and separate it from an overwhelmingly large background. We present the status of Higgs searches in the H->bb channel currently being performed within ATLAS.

- The poster abstract was accepted by the conference
- Will be presented by Patricia (random selection among list of volunteers)