H->bb Weekly Meeting

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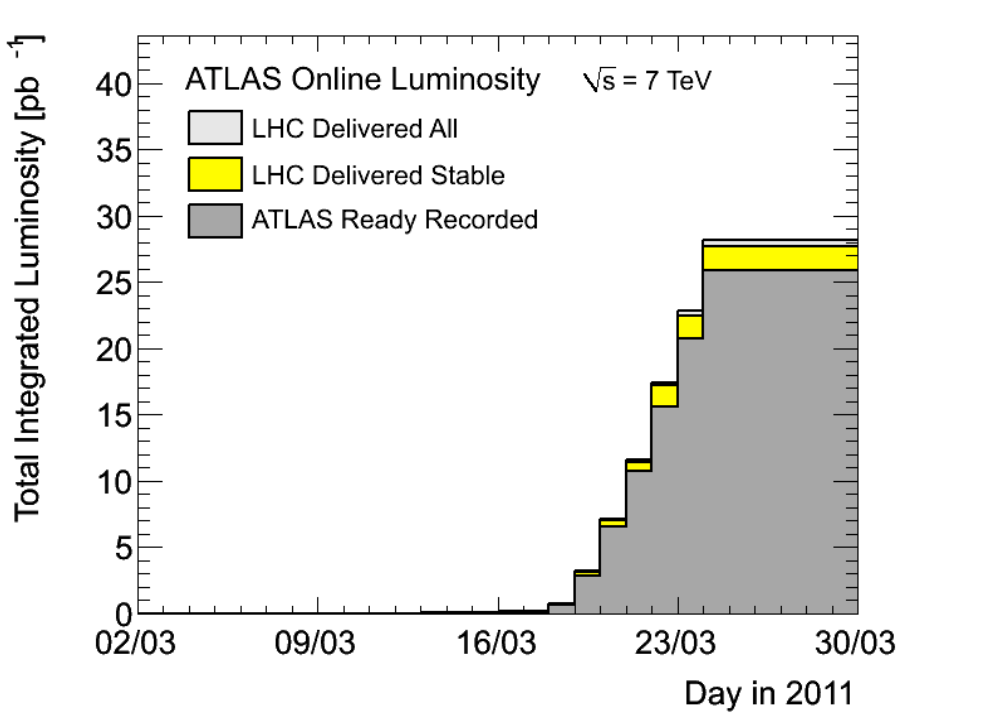
HSG5 H->bb Weekly Meeting, 29 March 2011

News! News! News!

- Technical stop this week
- Already ≈ 26 pb^{-1} collected with stable beams
  - But ≈ 10 pb^{-1} with no B field
- Peak luminosity ≈2.5 x 10^{32} $cm^{-2}s^{-1}$ with 200 bunches
  - ≈maximum we had last year
  - But with lower β^* and so higher pileup (around μ=8 so far)
  - Both in-time and out-of-time pileup will be important this year!



News! News! News!

- Preliminary meeting of physics+statistics forum: http://indico.cern.ch/conferenceDisplay.py?confId=131204
- New meeting on procedures for statistical interpretation of ATLAS results on April 15: https://indico.cern.ch/conferenceDisplay.py?confId=132499

Friday 15 April 2011

13:30 - 13:35	Introduction *05'*
13:40 - 14:05	Basic introduction to confidence limits (includes unified Feldman-Cousins intervals vs. one-sided upper limits) *25'*
14:15 - 14:40	Power Constrained Limits *25'*
15:00 - 15:15	Summary of the procedures currently recommended *15'*
15:30 - 15:45	Experience with the recommended procedures (Higgs group) *15'*
15:55 - 16:10	Views and experience from the Exotics group *15'*
16:20 - 16:35	Views and experience from the SUSY group *15'*
16:45 - 17:45	Final discussion *1h00'*
17:45 - 18:00	Conclusions *15'*

News! News! News!

- ATLAS NLO MC mini-workshop on Thursday this week
- Should be very interesting, especially for us!

14:30 - 18:30 **Session II: Higgs MC session**

Conveners: Reisaburo Tanaka (LAL), Junichi TANAKA (ICEPP, Univ. of Tokyo), Jae Yu (Texas)

Material: **Higgs NLO MC wish list**

14:30 **Introduction** *10'*
Speaker: Rei Tanaka (LAL-Orsay)

14:40 **New developments in Higgs NLO MC (Higgs + related SM BG)** *1h10'*

- MC@NLO *20'*
  Speaker: Stefano Frixione (CERN and EPFL)
- Powheg *20'*
  Speaker: Paolo Nason (INFN)
- Herwig++ *10'*
  Speaker: Keith Hamilton (INFN)
- Sherpa *20'*
  Speaker: Frank Siegert (Freiburg University)

15:50 **Validation status in ATLAS** *20'*
Speaker: Junichi TANAKA (ICEPP, Univ. of Tokyo)

16:10 **break** *20'*

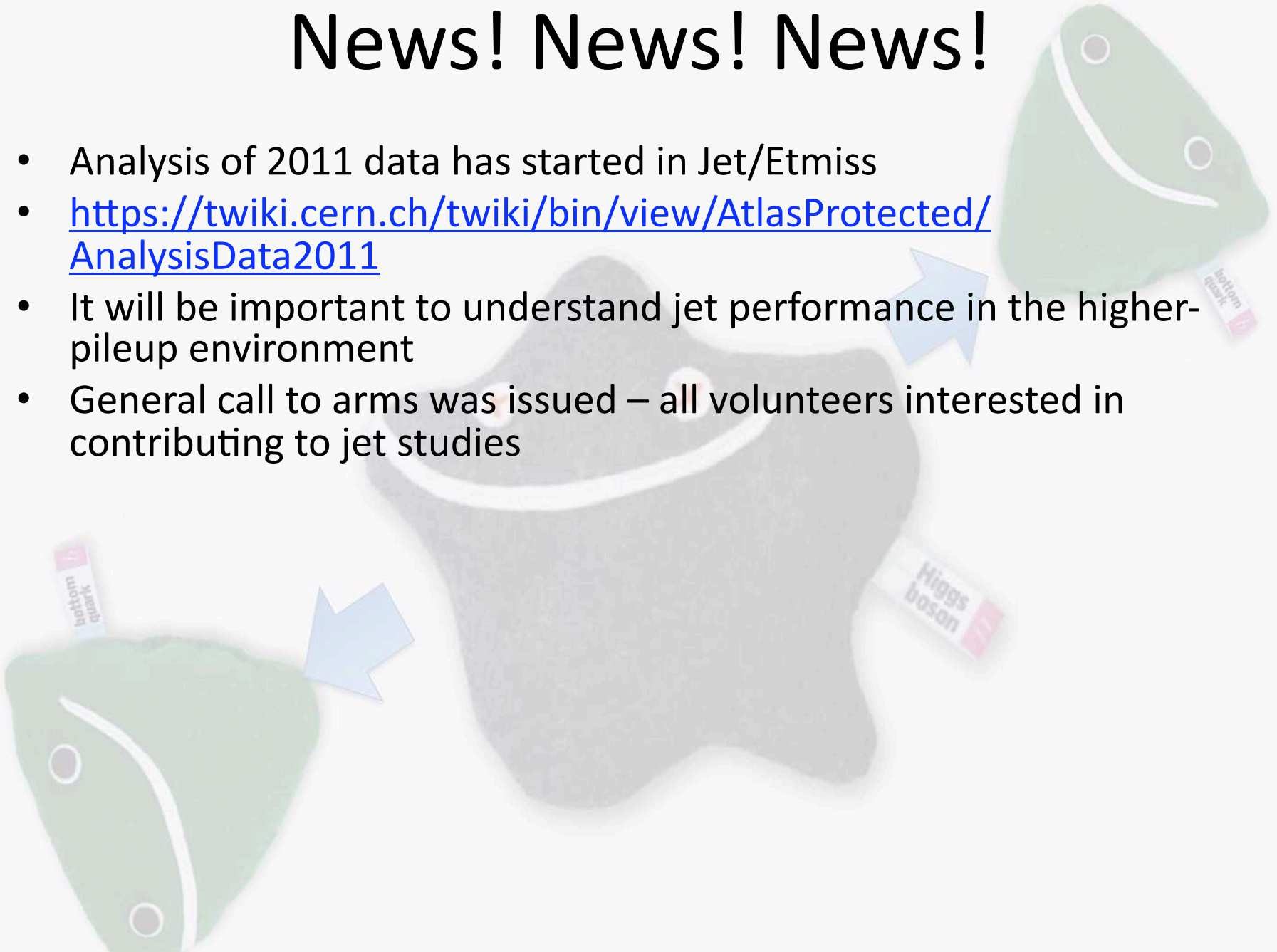
16:30 **Prophecy4f** *20'*
Speaker: Marcus Weber (MPI Munich)

16:50 **Higgs pT** *20'*
Speaker: Massimiliano Grazzini (Zurich)

17:10 **Round table discussion** *1h20'*

News! News! News!

- Analysis of 2011 data has started in Jet/Etmiss
- https://twiki.cern.ch/twiki/bin/view/AtlasProtected/AnalysisData2011
- It will be important to understand jet performance in the higher-pileup environment
- General call to arms was issued – all volunteers interested in contributing to jet studies

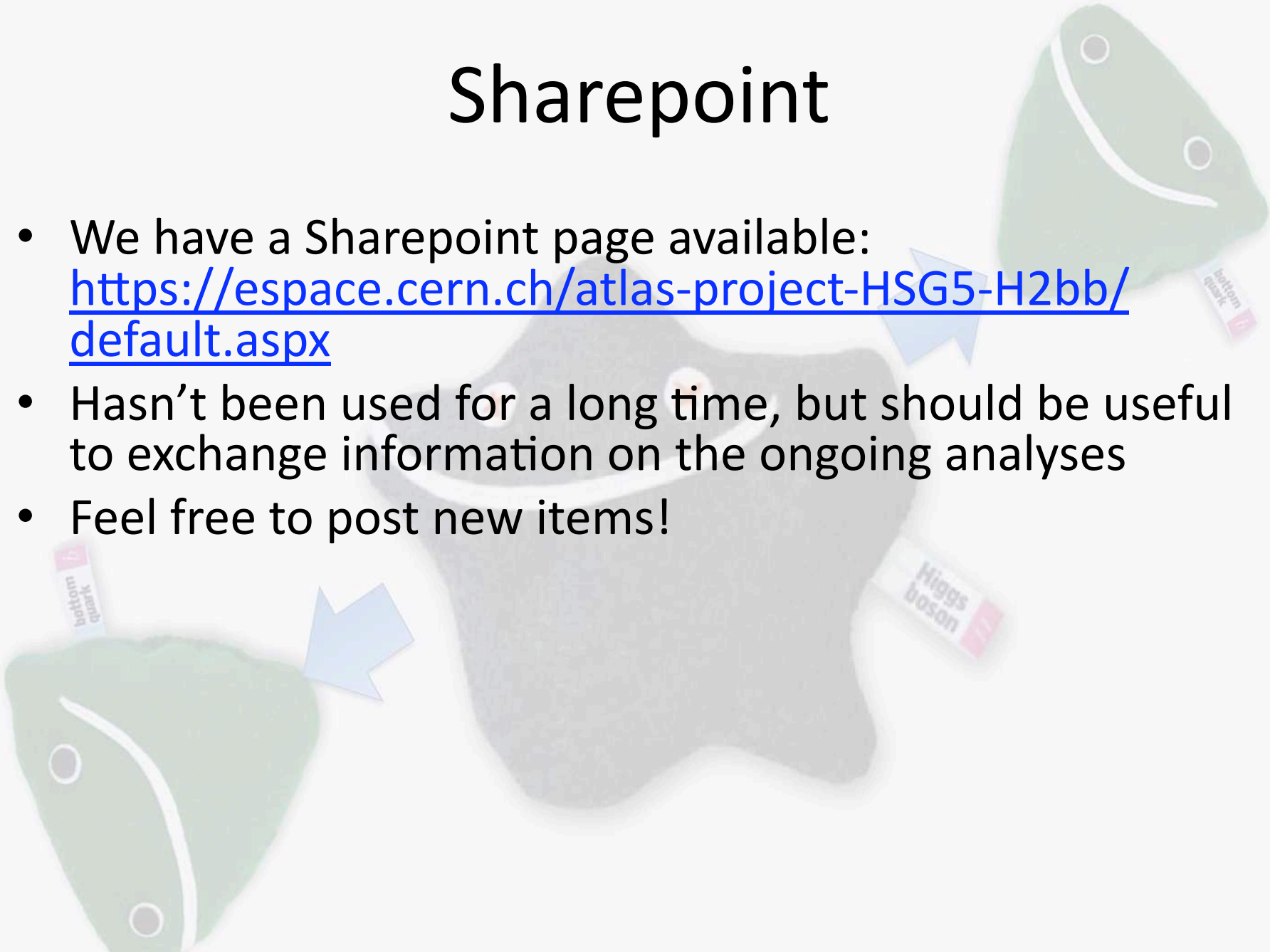


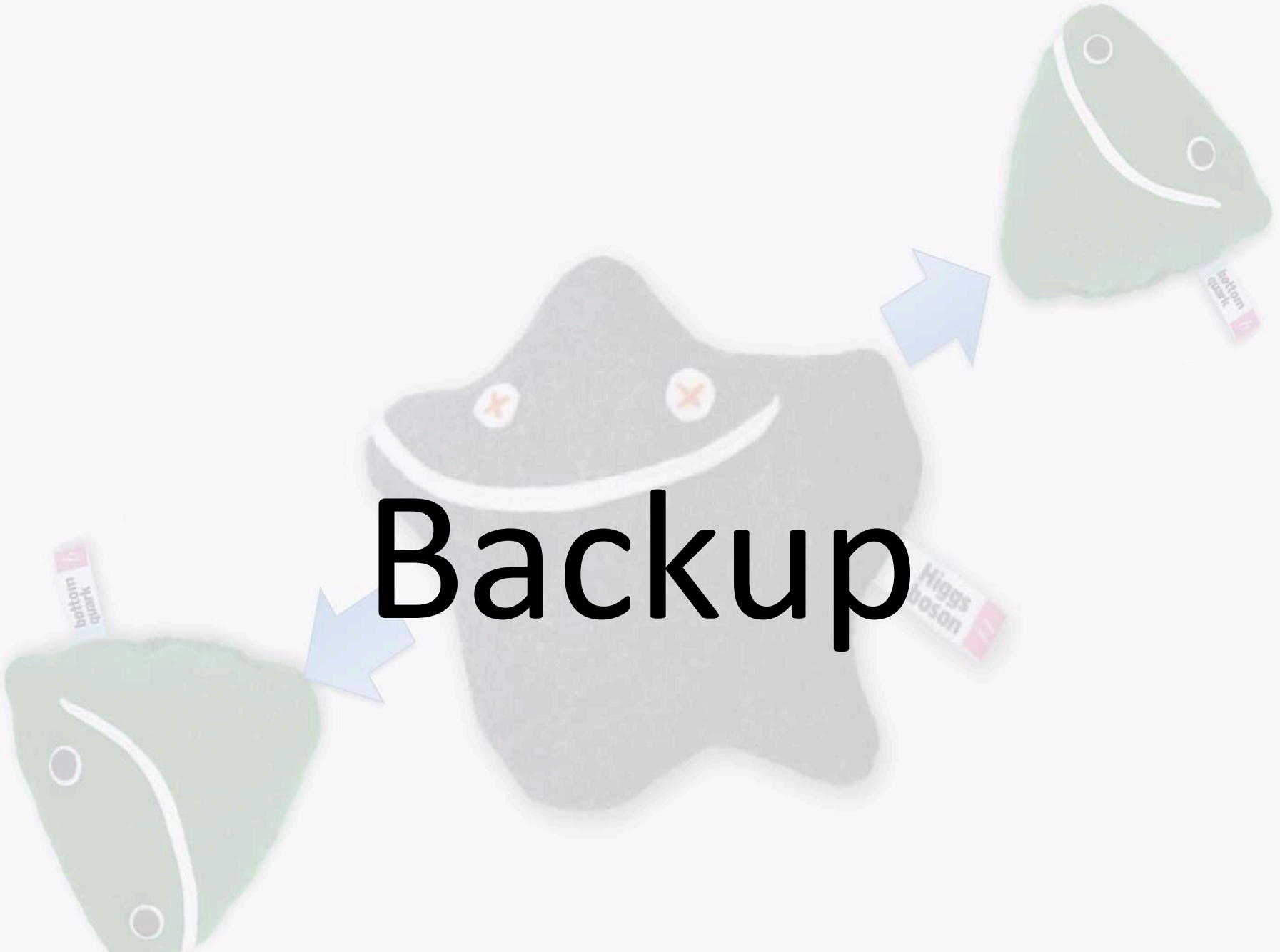
News! News! News!

- W/Z common selection seems to have become more stable
  - Version 1.2: https://espace.cern.ch/atlas-sm-wz-physics/Lists/Common%20Selection/AllItems.aspx
  - Aimed at W/Z 2010 data
- My proposal is that we should use this selection for now
  - Produce our first results for Dubna using 2010 data and this selection
    - We don't yet have **any** full analysis results from 2010 data!
  - Discussion later in today's meeting
- Then, before Dubna, we should compare results from 2010 data with 2011 data
  - Understand 2010 data to check for surprises in 2011 data…
  - First look from Lianliang already today – but remember we still have more 2010 data than 2011 data… and 2010 is well understood by CP groups
  - Adapt cuts/object selection as needed and as recommended by CP groups

Sharepoint

- We have a Sharepoint page available: https://espace.cern.ch/atlas-project-HSG5-H2bb/default.aspx
- Hasn't been used for a long time, but should be useful to exchange information on the ongoing analyses
- Feel free to post new items!





Backup

Proposed Roadmap for WH Analysis

- After the effort on cut flows, we're ready to start producing results!
  - Concentrating on un-boosted results here only because it's still unclear what would be feasible in boosted analysis until Dubna – commissioning work ongoing
  - BUT: work on boosted VH is starting in parallel – see e.g. Wahid's talk today
- Intended results:
  - Cut-based analysis focusing on WH -> e/μ ν b b
    - I think there should be at least 2 analyses, for cross checking results
    - Ideally using 2 different data formats (AOD vs D3PD)
  - Multivariate analysis in parallel, to improve on cut-based analysis
- Timeline:
  - Analyses should be semi-frozen by Dubna (17 – 19 May)
  - This leaves around 7 weeks
- Results in the form of:
  - Histogram with # events vs m_H
  - Table of # events expected for each value of m_H and background type – including statistical and systematic uncertainties
  - Exclusion plot vs m_H (95% C.L. limit on σ/σ_{SM})
  - …plus control plots etc

Questions to be answered

- Cut-based analysis focusing on WH -> e/μ ν b b
  - Establish analysis selection: why is each cut applied and why at each particular value? Are we convinced this is the right thing to do?
  - Establish set of systematic uncertainties: start from combined performance group recommendations. What are the most important? Are there any hidden pitfalls for us?
  - What b-taggers and why? What calibrations do we expect to be ready in time? What is the corresponding systematic uncertainty?
  - What sort of exclusion limits can we expect for 0.5, 1, 2 fb^{-1} ?

- Multivariate analysis in parallel, to improve on cut-based analysis
  - What event preselection should be used and why?
  - Use for signal-background separation only or target particular backgrounds?
  - What are the possible bias? Where can it go wrong?
  - What improvement can be expected wrt cut-based analysis for 0.5, 1, 2 fb^{-1} ?

- Exclusion plot vs m_H (95% C.L. limit on σ/σ_{SM})
  - Need someone to implement RooStats workspace

Date	Milestones wish list
17 May	Dubna workshop – analysis frozen After this: add data to un-boosted analysis and prepare for result approval Concentrate more effort on boosted VH with a view to obtaining results quickly
10 May	Review results with 2011 data from cut-based and multivariate analyses
3 May	Margin for dealing with unforeseen problems
26 April	Start looking at 2011 data if enough is available. Any surprises? How does the MC describe the new data? By now we should have a reasonable idea of results from the multivariate analysis
19 April	End of 2 weeks of beam scrubbing. (I'm away for Easter)
12 April	By now we should have a reasonable idea of the exclusion of the cut-based analysis First report on MVA preliminary results – establish plan for getting results by Dubna
5 April	Identify the worst systematics and discuss any possible improvements: •Any changes needed in analysis cuts? •Any study necessary for corrections to some systematic effect? Multivariate analysis: iterate on preselection cuts, methods, questions Assign tasks – divide the work to achieve better results!
29 March	Establish analysis cuts: •If possible as result of optimization •Use 2010 data to develop cuts and show that data is well described by background MC Start evaluating systematics
22 March	Iterate on analysis cuts – why is each cut applied at each particular value? Start iteration on multivariate methods to improve analysis

Reconstruction issues

- **Muon** CP group recommendations for release 16:
  - Reconstruction efficiency and isolation efficiency scale factors, momentum smearing functions
  - https://twiki.cern.ch/twiki/bin/view/AtlasProtected/MCPAnalysisGuidelinesRel16
- Jet/Etmiss recommendations for **jet cleaning** in release 16:
  - Medium jet cleaning should give similar rejection to rel 15 cleaning but with better efficiency
  - Tight jet cleaning should not be used – still under discussion
  - https://twiki.cern.ch/twiki/bin/view/AtlasProtected/HowToCleanJets#Bad_jets_rel16_data
- New!: Final **b-tagging calibrations** for release 16 based on full 2010 data:
  - https://twiki.cern.ch/twiki/bin/view/AtlasProtected/Analysis16
- e/gamma recommendations for **energy scale and resolution** in release 16:
  - https://twiki.cern.ch/twiki/bin/view/AtlasProtected/EnergyScaleResolutionRecommendations
  - And rescaler tool: https://twiki.cern.ch/twiki/bin/view/AtlasProtected/EnergyRescaler
- Standard Model **W/Z** group **baseline selection** for release 16 (next 4 slides):
  - See discussion in W/Z group Sharepoint
  - Also, finer points (and perhaps the not so fine) still being discussed