

H → bb Note Meeting

Malachi Schram, McGill
Ricardo Gonçalo, RHUL

H → bb 7TeV meeting, 5/11/2011

New Monte Carlo Samples

Channel	Sample ID	Generator	#events	M_H (GeV)
VBF H->bb	116306	Herwig	30k	115
	116307	Herwig	30k	125
	116308	Herwig	30k	130
WH	116309	Pythia	30k	115
	116310	Pythia	30k	125
	116311	Pythia	30k	130
ZH	116312	Pythia	30k	115
	116313	Pythia	30k	125
	116314	Pythia	30k	130
ttH -> l ⁺ v jj bb	116300	Pythia	30k	115
	116301	Pythia	30k	125
	116302	Pythia	30k	125
ttH -> l ⁺ v jj bb	116303	Pythia	30k	115
	116304	Pythia	30k	125
	116305	Pythia	30k	125
Zbb+ γ	109370	Sherpa	50k	--
bb+ γ	109371	Sherpa	50k	--

- New samples being produced/finished
- MC09 samples to be reprocessed with MC10
- Still to come: hadronic ttH
- Thanks to Chris and Malachi for pushing these through!



Trigger Validation “Sample T”

- In addition to these, there is a set of data samples intended for checking new trigger menus
- First production to happen in next few days
- Important that interested groups check samples and provide feedback to Higgs trigger contact, Gemma Wooden

Sample ID	Nr. Events	Description	Higgs mass
109910	10k	bbA, A->tautau->lh	120
105333	10k	VBF H->tautau->ll	120
106534	10k	H->WW->lnulnu	130
106384	10k	H->gamgam	120
116002	10k	H->ZZ->llnunu	300
109851	20k	tt->bWbH+: H+>tau(inc)nu, W->inc	130
109855	10k	tt->bWbH+: H+>cs, W->inc	130
109921	10k	bbA, A->tautau->hh	100
109861	10k	nMSSM a->mumu	7
109351	10k	ZH, H->bb & Z->nunu	120
105338	10k	VBF H->tautau->hh	120
109840	10k	ttH->(blnu)(bqq)bb	120
116342	10k	H->WW->lnuqq	300
116127	10k	WH, H->bb	120
106324	10k	VBF H -> inv	250
109930	10k	bbA, A->mumu	120
105300	10k	H->ZZ->4l	130
105334	10k	VBF H->tautau->lh	120
109900	10k	bbA, A->tautau->ll	120
?	10k	ttH (fully-Hadronic)	?
total	210k		

- Previous workshop at CERN focused on inclusive cross sections
- This one devoted to discussions of exclusive Higgs cross-sections

Meeting place:
"Dipartimento Interateneo di
Fisica M. Merlin"
Università, Politecnico and
INFN Sezione di Bari

Via Orabona 103

Organization:

- ◇ Nicola De Filippis
- ◇ Stefan Dittmaier
- ◇ Chiara Mariotti
- ◇ Giampiero Passarino
- ◇ Reisaburo Tanaka

Workshop of LHC Higgs Cross Section Working Group in BARI

The LHC Higgs boson x-section group started his activity in January 2010 with the purpose of providing the members of the group with the most up-to-date information on the relevant observables relevant to the Standard Model and MSSM Higgs boson(s). The group works across the LHC communities of theorists and experimentalists to profit from the best expertise on the relevant topics.

The workshop in Bari is the 3rd of the series and aim to be a milestone for the activity of the group. The main goal of the workshop is to finalize a first note about the group activity and publish it as a CERN Yellow Report. Cross sections values for the different SM and MSSM Higgs production mechanisms/decay channels need to be derived after applying effective cuts on the relevant experimental observables.

Summary

■ Plan of Activity

- ◆ $VH \rightarrow Vb\bar{b}$: comparison of NLO with LO (signal and background), pt-dependent K-factors, impact of NLO on analysis cuts
- ◆ $t\bar{t}H \rightarrow t\bar{t}b\bar{b}$: TBD

■ List of LO/NLO MC Used

- ◆ $VH \rightarrow Vb\bar{b}$: MC@NLO, POWHEG, Pythia, MCFM
- ◆ $t\bar{t}H \rightarrow t\bar{t}b\bar{b}$: Pythia, CompHEP, AcerMC, MC@NLO, Alpgen

■ Wish List for Theorists

- ◆ $VH \rightarrow Vb\bar{b}$: fully differential predictions
- ◆ $t\bar{t}H \rightarrow t\bar{t}b\bar{b}$: NLO signal and background MC, LO-NLO shape comparison for signal and background

■ Common Selection Cuts (ATLAS/CMS)

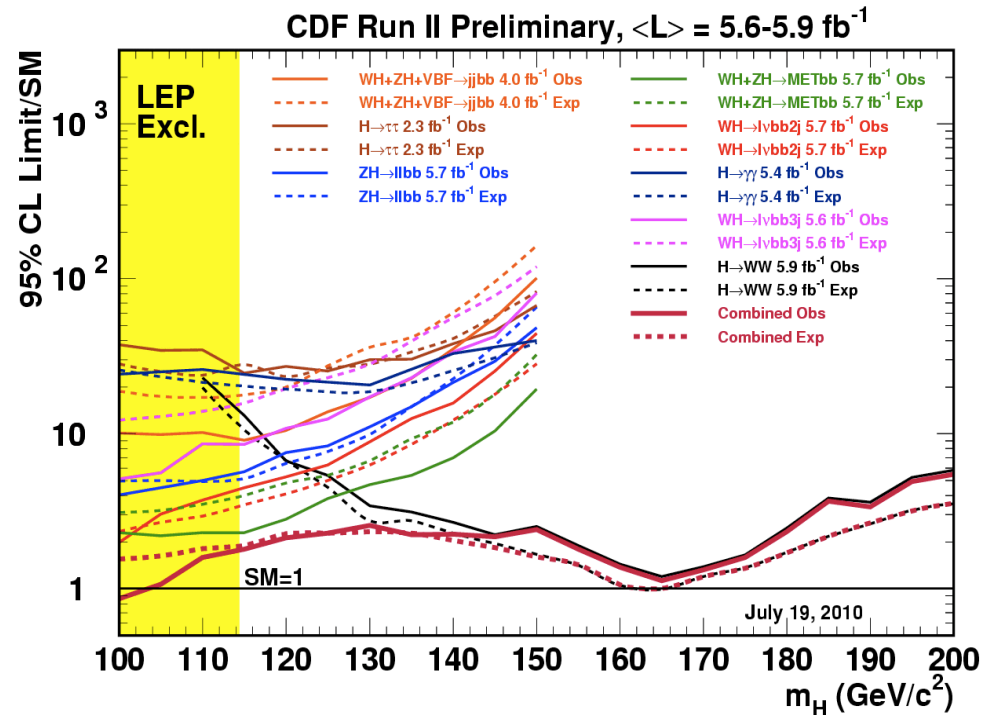
- ◆ $VH \rightarrow Vb\bar{b}$: $p_T(H) > 200$ GeV, $p_T(V) > 200$ GeV, no additional CA jets with $p_T > 20$ GeV.
- ◆ $t\bar{t}H \rightarrow t\bar{t}b\bar{b}$: 1 isolated lepton with $p_T > 25$ GeV, ≥ 6 jets with $p_T > 20$ GeV, ≥ 4 b-tags

CONF Note Plans

- Plan to propose one CONF note intended for Moriond 2011:
“Estimation of the Z+jets background to $ZH \rightarrow llbb$ Search with the ATLAS Detector at 7TeV”
- Based on SM Z+jets analysis
 - Follow same cut flow up to “pre-tag” stage only, to avoid b-tagging calibration and b-jet energy scale issues
 - Follow same systematics as Z+jets analysis
- Intend to use rel.16: updated Z-width calibrations from data/MC comparison, updated trigger, updated jet EDM
- Latest status report in Malachi’s talk at our last meeting:
 - <http://indico.cern.ch/getFile.py/access?contribId=2&resId=0&materialId=slides&confId=109652>

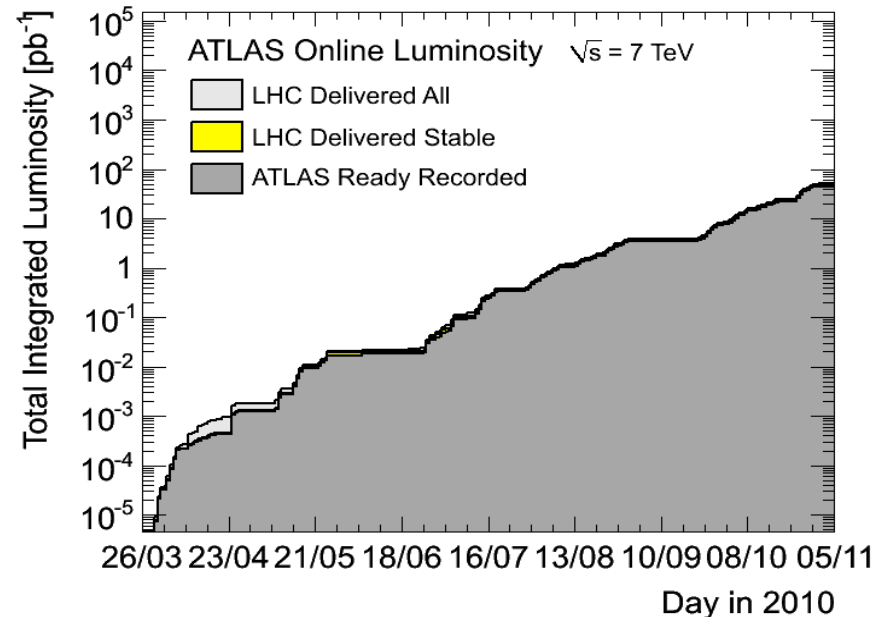
Uncovered Channels

- Next year we have good chances of excluding a large range of Higgs masses
- Should try to cover all possibilities... the tevatron is covering all possibilities... 😊
- Several good channels are available for interested people
 - WH- \rightarrow v**bb**
 - MSSM H- \rightarrow bb: see Eirik Gramstad's talk in Dubna:
<http://indico.cern.ch/getFile.py/access?contribId=32&sessionId=7&resId=0&materialId=slides&confId=83611>
 - But Eirik can't follow up. Any takers?







Food for Thought: The Road Ahead

- Need to think about our goals for next year:
 - Moriond: try to get one CONF note (ZH backgrounds)
 - Anything for Summer conferences?
 - What partial results do we expect to have at the end of Summer 2011?
- Expect 1fb^{-1} at end of 2011:
 - Would mean running for about 40 weeks at our best lumi and performance so far
 - But expect to go higher in instantaneous luminosity (perhaps x10)
 - Current estimates are to reach $\sim 1.6\text{E}33$ next year – assumes all bunches filled at nominal charge and perhaps smaller β^*
 - Can we get more than 1fb^{-1} ?
- By end of 2011 should have all machinery in place to make exclusion plots including H \rightarrow bb channels



Today's Agenda

Friday 05 November 2010

- | | | |
|---------------|---|---|
| 16:00 - 16:10 | Introduction 10'
Speakers: Malachi Schram (McGill University) , Ricardo Jose Morais Silva Goncalo (Royal Holloway) | ▼ |
| 16:15 - 16:25 | Status of the Hadronic ttH Analysis 10'
Speaker: Michael Nash (University College London, Rutherford Appleton Laboratory)
Material: Slides  | ▼ |
| 16:30 - 16:35 | Status of the Semileptonic ttH Analysis from Glasgow 05'
Speakers: Alistair Gemell (University of Glasgow) , Christopher Collins-Tooth (University of Glasgow)
Material: Slides  | ▼ |
| 16:40 - 17:00 | Combination of the Fat Jets and Cut-Based Analysis 20'
Speaker: Catrin Bernius (University College London-University of London)
Material: Slides  | ▼ |
| 17:05 - 17:20 | Status of the VBF H->bb Analysis 15'
Speaker: Eric Ouellette (University of Victoria-Unknown-Unknown)
Material: Slides  | ▼ |
| 17:25 - 17:40 | Status of the Non-boosted WH->llvv Analysis 15'
Speakers: Paul Thompson (University of Birmingham) , Andrew Mehta (Oliver Lodge Laboratory-University of Liverpool) | ▼ |
| 17:45 - 17:50 | Status of the Boosted WH Analysis from LIP-Lisbon 05'
Speakers: Patricia Conde Muñio (LIP-Lisbon) , Joana Machado Miguens (LIP - Laboratorio de Instrumentacao e Fisica Experimental de Particulas - Lisbon) | ▼ |