Weekly report

Yaquan Fang, Xinchou Lou,
Xiaohu Sun, Huijun Zhang
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IHEP

LHCDays in Split 2014

- Report on BSM Higgs searches on behalf of the ATLAS collaboration in the first week of Oct

Beyond-Standard-Model Higgs searches with the ATLAS detector

Xiaohu SUN on behalf of the ATLAS Collaboration

Institute of High Energy Physics, CAS

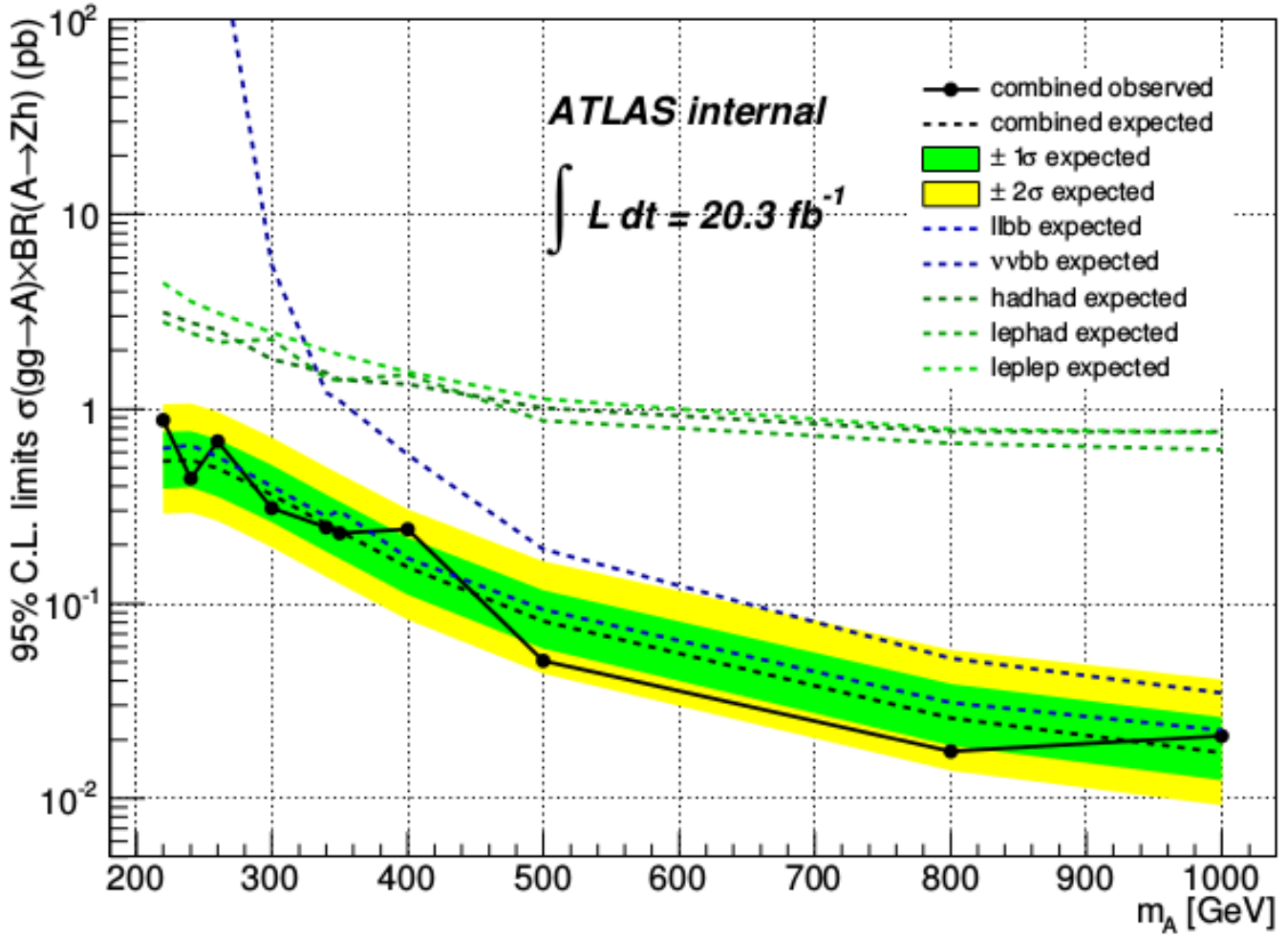
29 Sept 2014

ATLAS EXPERIMENT

中国科学院高能物理研究所
Institute of High Energy Physics Chinese Academy of Sciences

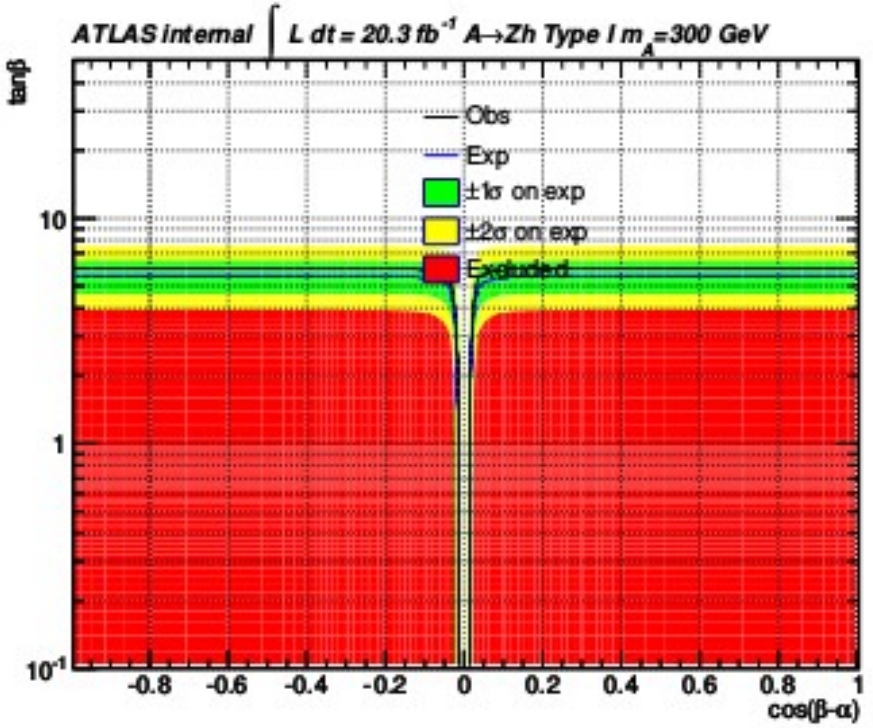
Latest on AZh combination

- The combined upper limit setting including all 5 subchannels

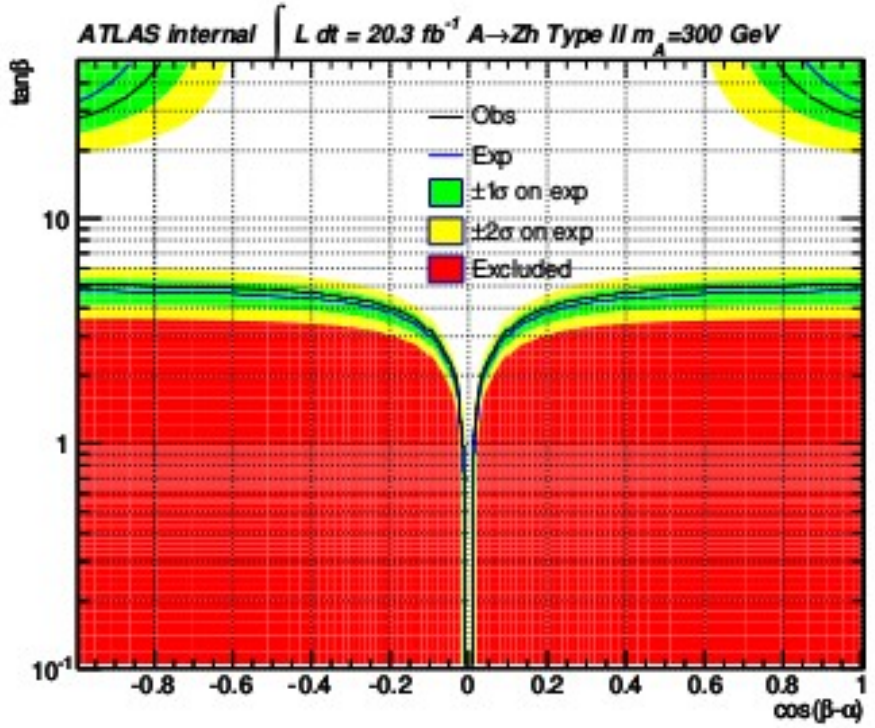


Interpretation with AZh limits

- The exclusion plots for 2HDM type I and II with the combined results



(a) Type I, m_A=300 GeV



(b) Type II, m_A=300 GeV

Interpretation issues (AZh)

- Due to the different scales on h->tautau and h->bb, it is technically not possible to interpret type III and IV

	Type I	Type II	Type III	Type IV
ξ_h^V	$\sin(\beta-\alpha)$	$\sin(\beta-\alpha)$	$\sin(\beta-\alpha)$	$\sin(\beta-\alpha)$
ξ_h^u	$\frac{\cos\alpha}{\sin\beta}$	$\frac{\cos\alpha}{\sin\beta}$	$\frac{\cos\alpha}{\sin\beta}$	$\frac{\cos\alpha}{\sin\beta}$
ξ_h^d	$\frac{\cos\alpha}{\sin\beta}$	$-\frac{\sin\alpha}{\cos\beta}$	$\frac{\cos\alpha}{\sin\beta}$	$-\frac{\sin\alpha}{\cos\beta}$
ξ_h^l	$\frac{\cos\alpha}{\sin\beta}$	$-\frac{\sin\alpha}{\cos\beta}$	$-\frac{\sin\alpha}{\cos\beta}$	$\frac{\cos\alpha}{\cos\beta}$

- There are not quite many physics interests in type III and type IV, so for the time-being, the interpretation will happen only for type I and II
- In type I and II, we also have the problem of rescaling the branching ratios (h->tautau,h->bb), since one cannot simply rescale only for signal, i.e. rescale the limits directly.
- From tautau side, SM Zh production takes up 20% backgrounds which should also be rescaled. That means redo the fit (very very time consuming). Still under discussion...

hh decay channels

- Introduced by other people before my talk
  - br(hh → bbbb) = 0.3329
  - br(hh → bbtautau) = 0.0729
  - br(hh → bbyy) = 0.0026
- Other decay channels considered here
  - br(hh → WWyy) = 0.0010 (ongoing RUN I)
  - br(hh → ZZyy) = 0.0001

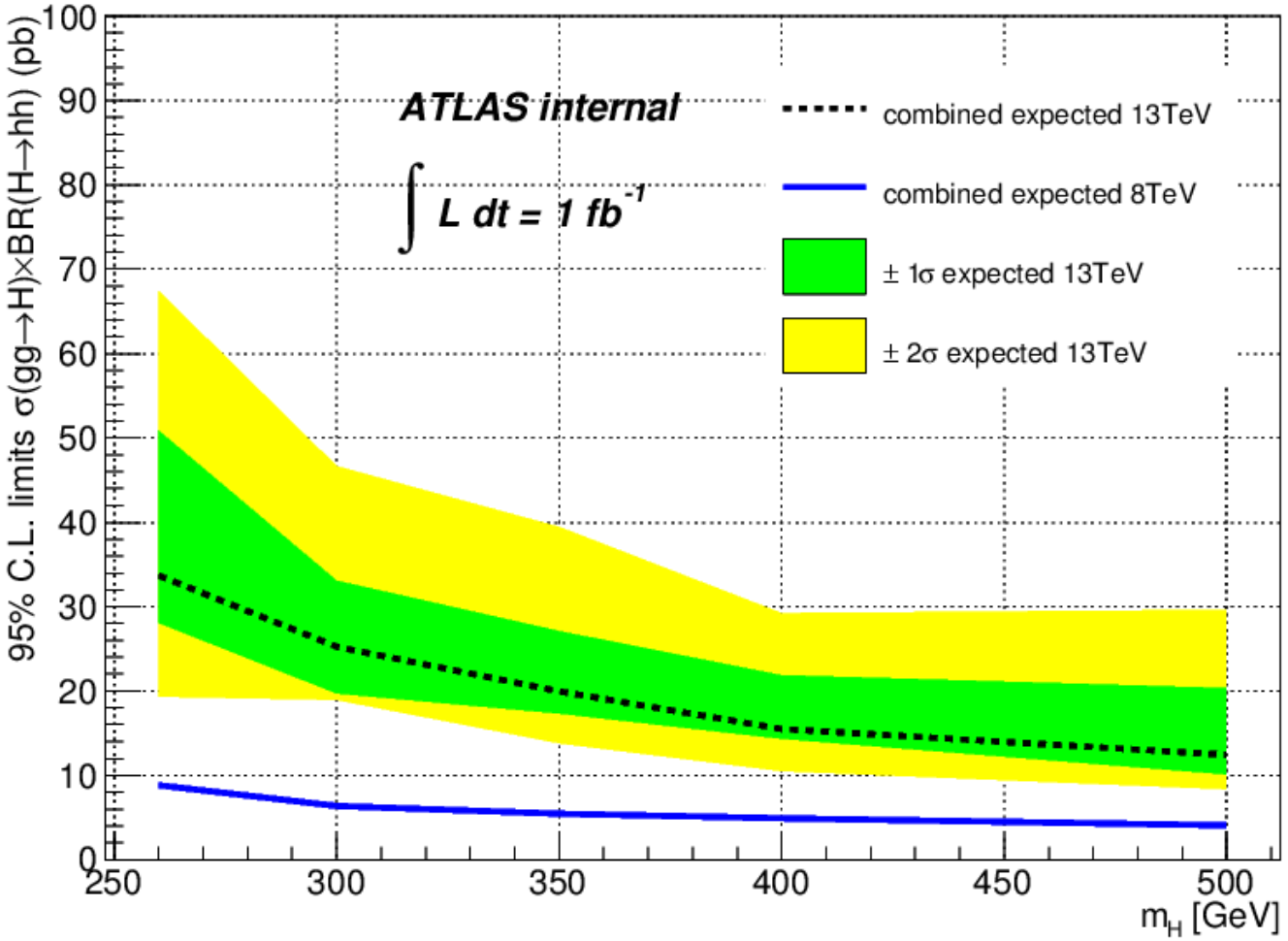
Projection 8 TeV to 13 TeV

- Luminosity configuration:
  - L = 1 fb-1; 15 fb-1; 300 fb-1
- Signal scales by 3.1 (typeII LHCHXSWG-2013-001)
- Continuous background scales by 2.8 (MadGraph)
- SM Higgs backgrounds scale

	ggF	VBF	VH	ttH
scale	2.3	2.3	2.0	3.8

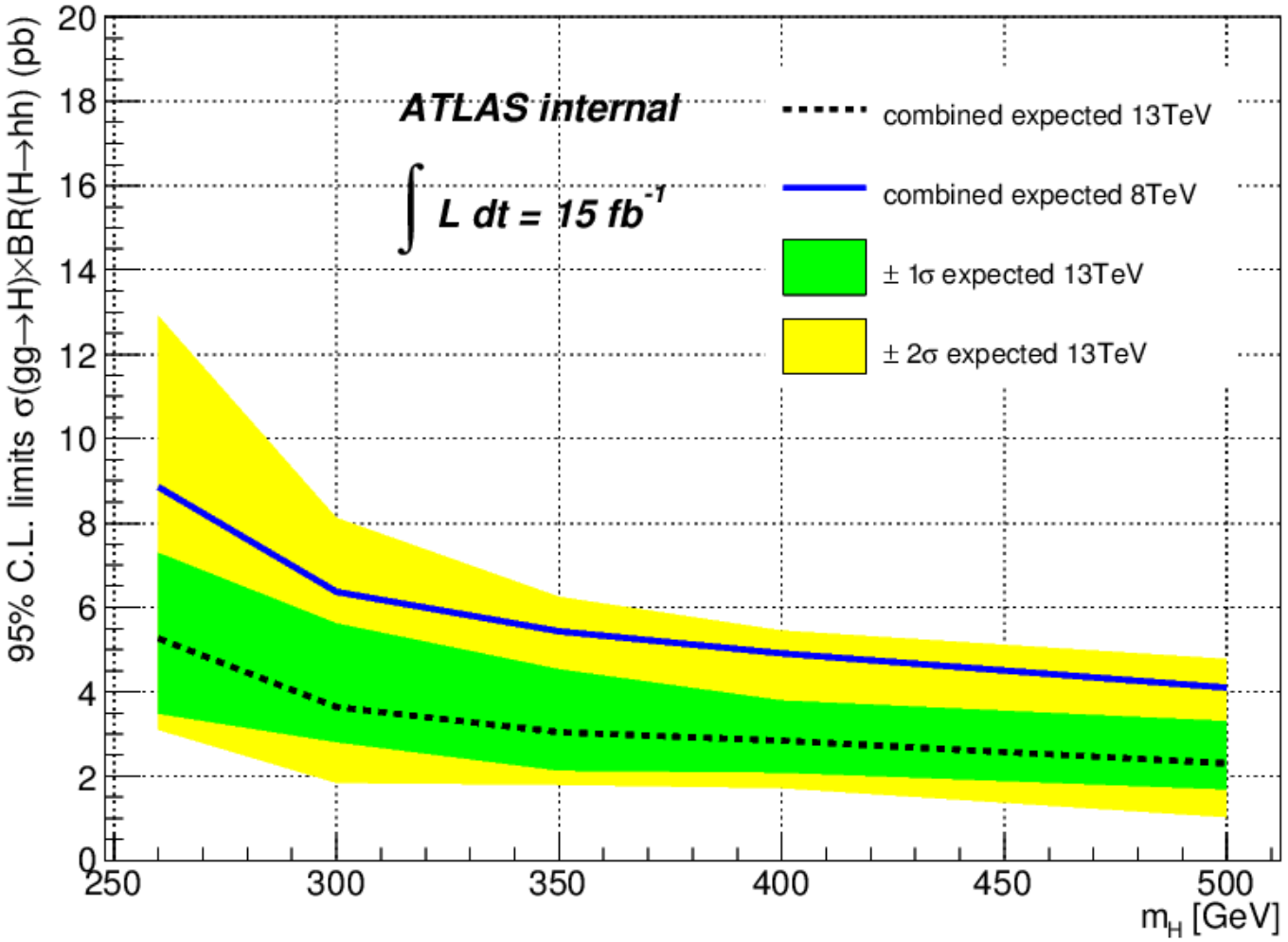
Projection to 13TeV 1fb-1

- With the first 50ns data, ~ 1fb-1, it does not give improvement from expectation compared to the blue curve extracted for 8TeV



Projection to 13TeV 15fb-1

- With the planned first year data, ~ 15fb-1, can reach the same sensitivity as seen by 8TeV with 20fb-1 data



Projection to 13TeV 300fb-1

- When the data accumulated to 300 fb-1, the sensitivity will reach 5 to 10 times better