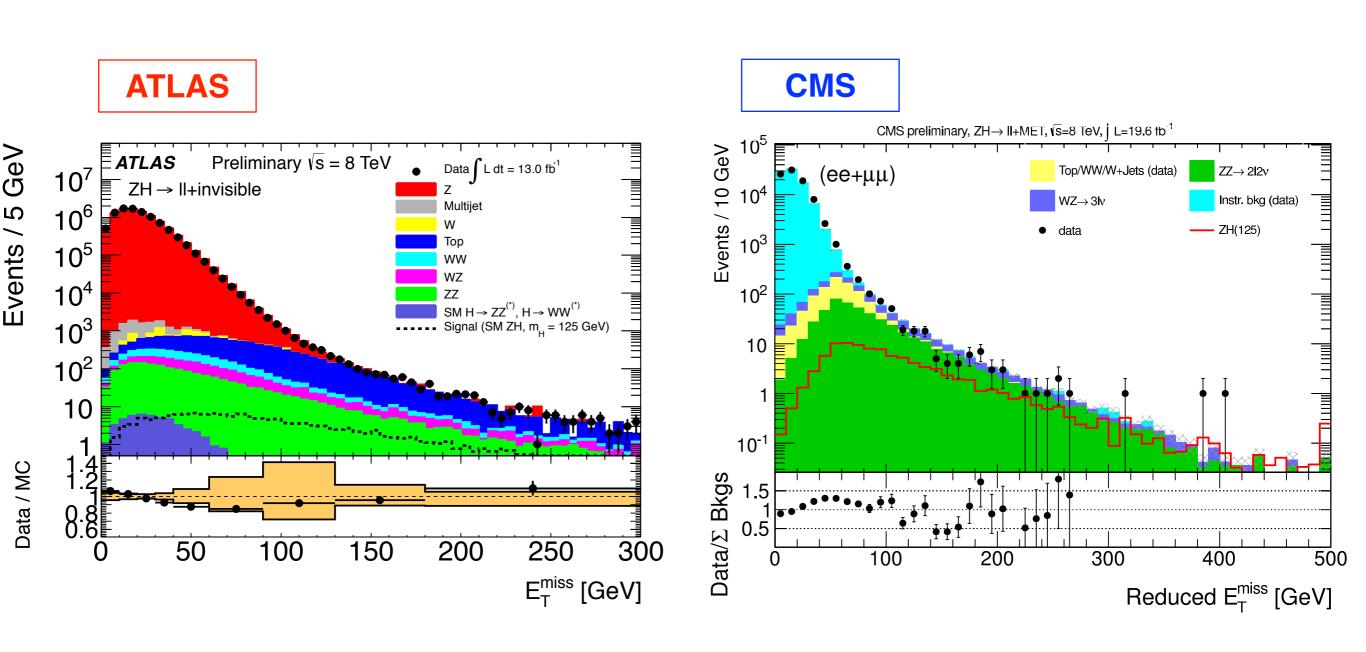
Searches for Higgs→Invisible Decays in ATLAS & CMS

CERN Cross-Talk Seminar August 15, 2013

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- ** Massachusetts Institute of Technology (CMS)

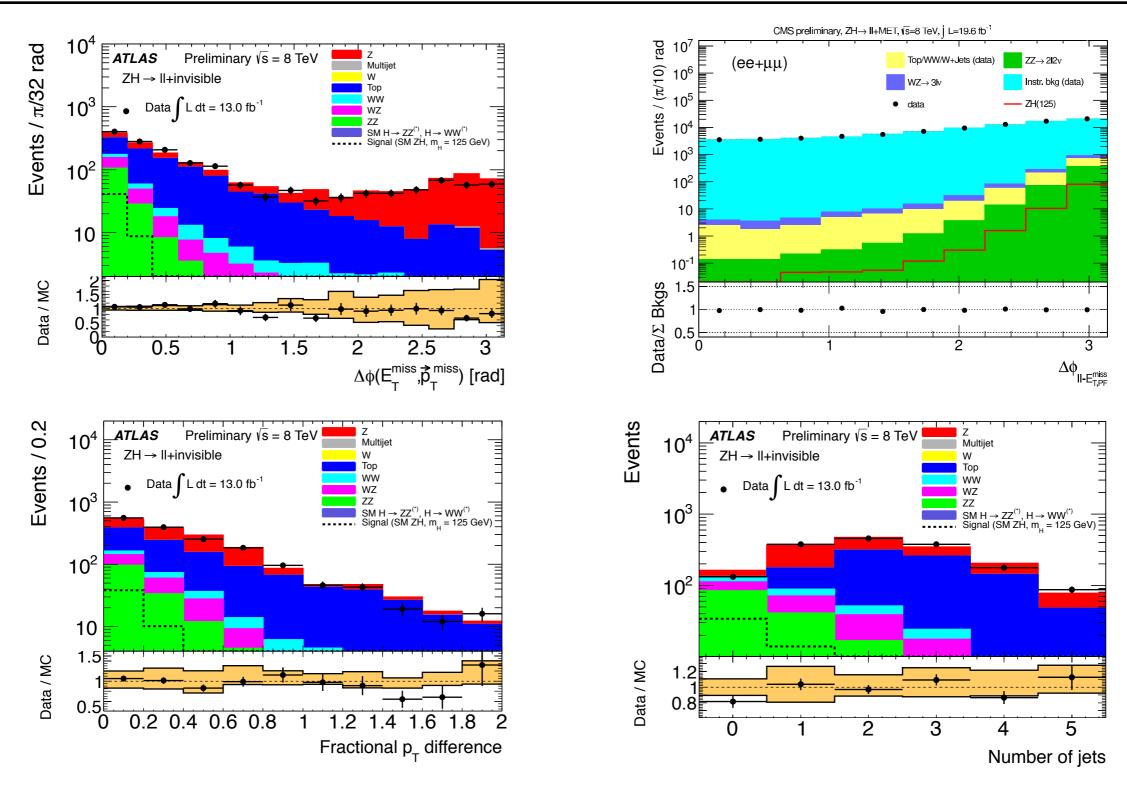
E_Tmiss Distributions



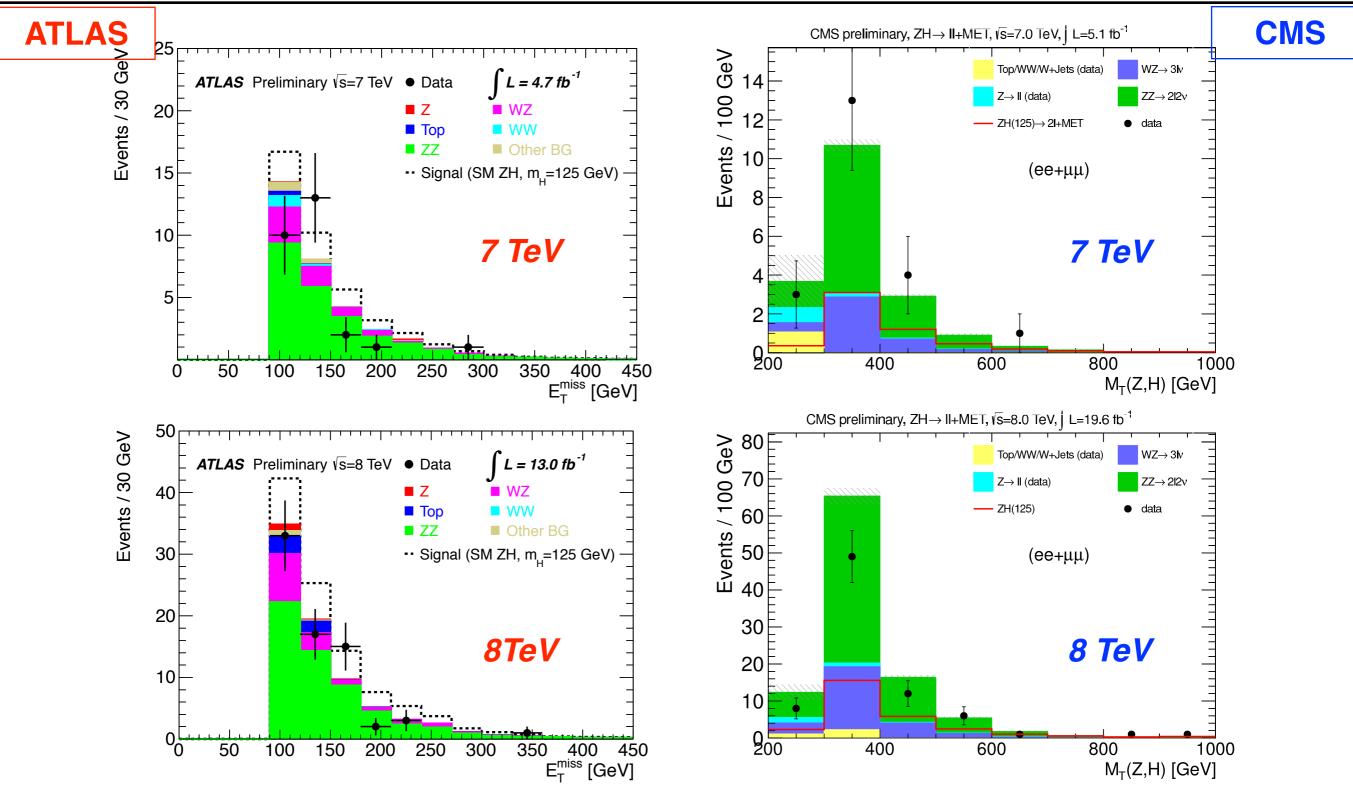
ATLAS-CONF-2013-011

CMS-PAS-HIG-13-018

Other Distributions



Signal Regions



BG/Signal Yields

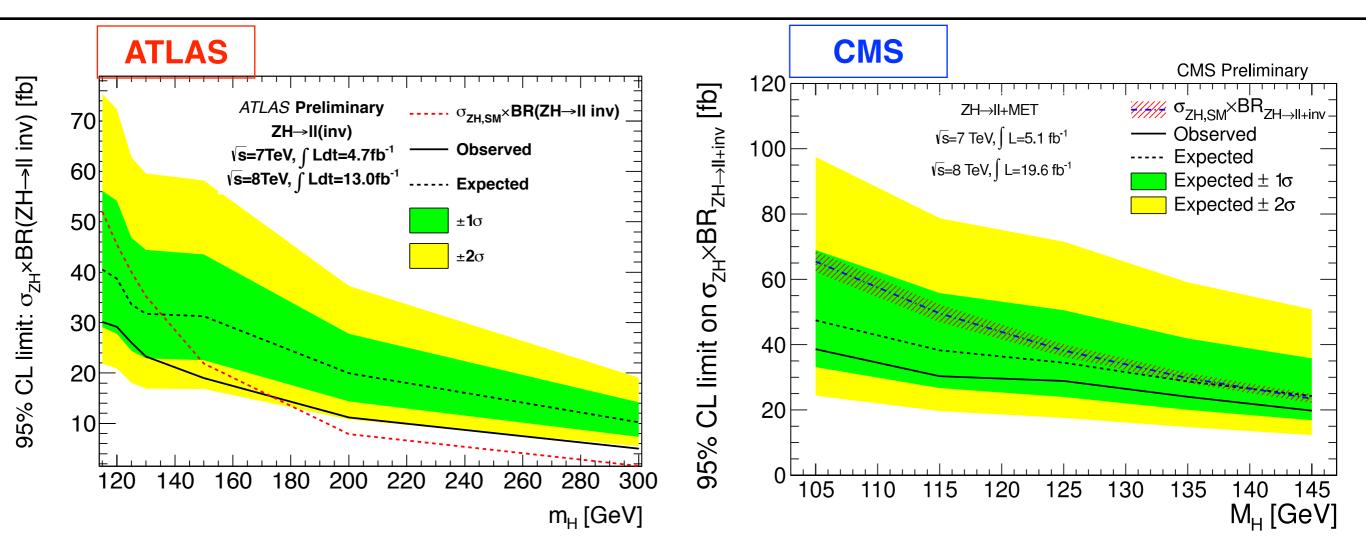
ATLAS

Data Period 2011 (7 TeV) 2012 (8 TeV) 13.0 fb ZZ 23.5 ± 0.8 ± 2.5 56.5 ± 1.2 ± 5.7 WZ 6.2 ± 0.4 ± 0.7 13.9 ± 1.2 ± 2.1 WW 1.1 ± 0.2 ± 0.2 used $e\mu$ data-driven Top quark 0.4 ± 0.1 ± 0.4 used $e\mu$ data-driven Z 0.16 ± 0.13 ± 0.09 1.4 ± 0.4 ± 0.7 W + jets, multijet 1.3 ± 0.3 ± 0.2 1.4 ± 0.4 ± 0.3 Total BG 32.7 ± 1.0 ± 2.6 78.0 ± 2.0 ± 6.5 Observed 27 71			
WZ $6.2 \pm 0.4 \pm 0.7$ $13.9 \pm 1.2 \pm 2.1$ WW $1.1 \pm 0.2 \pm 0.2$ used $e\mu$ data-driven Top quark $0.4 \pm 0.1 \pm 0.4$ used $e\mu$ data-driven Top quark, WW and $Z \rightarrow \tau\tau$ ($e\mu$ data-driven) used MC $4.9 \pm 0.9 \pm 0.2$ Z $0.16 \pm 0.13 \pm 0.09$ $1.4 \pm 0.4 \pm 0.7$ W + jets, multijet $1.3 \pm 0.3 \pm 0.2$ $1.4 \pm 0.4 \pm 0.3$ Total BG $32.7 \pm 1.0 \pm 2.6$ $78.0 \pm 2.0 \pm 6.5$	Data Period	2011 (7 TeV)	2012 (8 TeV) 13.0 fb
WW $1.1 \pm 0.2 \pm 0.2$ used $e\mu$ data-driven Top quark $0.4 \pm 0.1 \pm 0.4$ used $e\mu$ data-driven Top quark, WW and $Z \rightarrow \tau\tau$ ($e\mu$ data-driven) used MC $4.9 \pm 0.9 \pm 0.2$ Z $0.16 \pm 0.13 \pm 0.09$ $1.4 \pm 0.4 \pm 0.7$ W + jets, multijet $1.3 \pm 0.3 \pm 0.2$ $1.4 \pm 0.4 \pm 0.3$ Total BG $32.7 \pm 1.0 \pm 2.6$ $78.0 \pm 2.0 \pm 6.5$	ZZ	$23.5 \pm 0.8 \pm 2.5$	$56.5 \pm 1.2 \pm 5.7$
Top quark $0.4 \pm 0.1 \pm 0.4$ used $e\mu$ data-driven Top quark, WW and $Z \rightarrow \tau\tau$ ($e\mu$ data-driven) used MC $4.9 \pm 0.9 \pm 0.2$ Z $0.16 \pm 0.13 \pm 0.09$ $1.4 \pm 0.4 \pm 0.7$ W + jets, multijet $1.3 \pm 0.3 \pm 0.2$ $1.4 \pm 0.4 \pm 0.3$ Total BG $32.7 \pm 1.0 \pm 2.6$ $78.0 \pm 2.0 \pm 6.5$	WZ	$6.2 \pm 0.4 \pm 0.7$	$13.9 \pm 1.2 \pm 2.1$
Top quark, WW and $Z \to \tau\tau$ (e μ data-driven) used MC $4.9 \pm 0.9 \pm 0.2$ $0.16 \pm 0.13 \pm 0.09$ $1.4 \pm 0.4 \pm 0.7$ W + jets, multijet $1.3 \pm 0.3 \pm 0.2$ $1.4 \pm 0.4 \pm 0.3$ $32.7 \pm 1.0 \pm 2.6$ $78.0 \pm 2.0 \pm 6.5$	WW	$1.1 \pm 0.2 \pm 0.2$	used $e\mu$ data-driven
Z $0.16 \pm 0.13 \pm 0.09$ $1.4 \pm 0.4 \pm 0.7$ $W + \text{jets, multijet}$ $1.3 \pm 0.3 \pm 0.2$ $1.4 \pm 0.4 \pm 0.3$ $32.7 \pm 1.0 \pm 2.6$ $78.0 \pm 2.0 \pm 6.5$	Top quark	$0.4 \pm 0.1 \pm 0.4$	used $e\mu$ data-driven
$W + \text{jets, multijet}$ $1.3 \pm 0.3 \pm 0.2$ $1.4 \pm 0.4 \pm 0.3$ Total BG $32.7 \pm 1.0 \pm 2.6$ $78.0 \pm 2.0 \pm 6.5$	Top quark, WW and $Z \rightarrow \tau\tau$ ($e\mu$ data-driven)	used MC	$4.9 \pm 0.9 \pm 0.2$
Total BG $32.7 \pm 1.0 \pm 2.6$ $78.0 \pm 2.0 \pm 6.5$	Z	$0.16 \pm 0.13 \pm 0.09$	$1.4 \pm 0.4 \pm 0.7$
	W + jets, multijet	$1.3 \pm 0.3 \pm 0.2$	$1.4 \pm 0.4 \pm 0.3$
Observed 27 71	Total BG	$32.7 \pm 1.0 \pm 2.6$	$78.0 \pm 2.0 \pm 6.5$
	Observed	27	71

CMS

process	$\sqrt{s} = 7 \text{ TeV}$	$\sqrt{s} = 8 \text{ TeV} 1$	9.6 fb ⁻¹
$m_{\mathrm{H}}=125\mathrm{GeV}$	5.9 ± 0.6	27.3 ± 3.0	
$Z/\gamma^* o \ell^+\ell^-$	0.4 ± 0.4	0.5 ± 0.5	
WZ	4.2 ± 0.6	22.1 ± 3.0	
ZZ	15.1 ± 1.5	64.2 ± 6.8	
W + jets/WW/top	0.1 ± 0.3	1.8 ± 1.0	
total bkg.	19.8 ± 1.7	88.6 ± 7.5	
data	22	78	

Limits



At M_H=125 GeV:

- ATLAS: BR(H→inv) < 65% (obs), 84% (exp) at 95% CL w/ 4.7+13.0 fb⁻¹
- CMS: BR(H→inv) < 75% (obs), 91% (exp) at 95% CL w/ 5.1+19.6 fb⁻¹