

# The ATLAS “last” sophisticated analysis

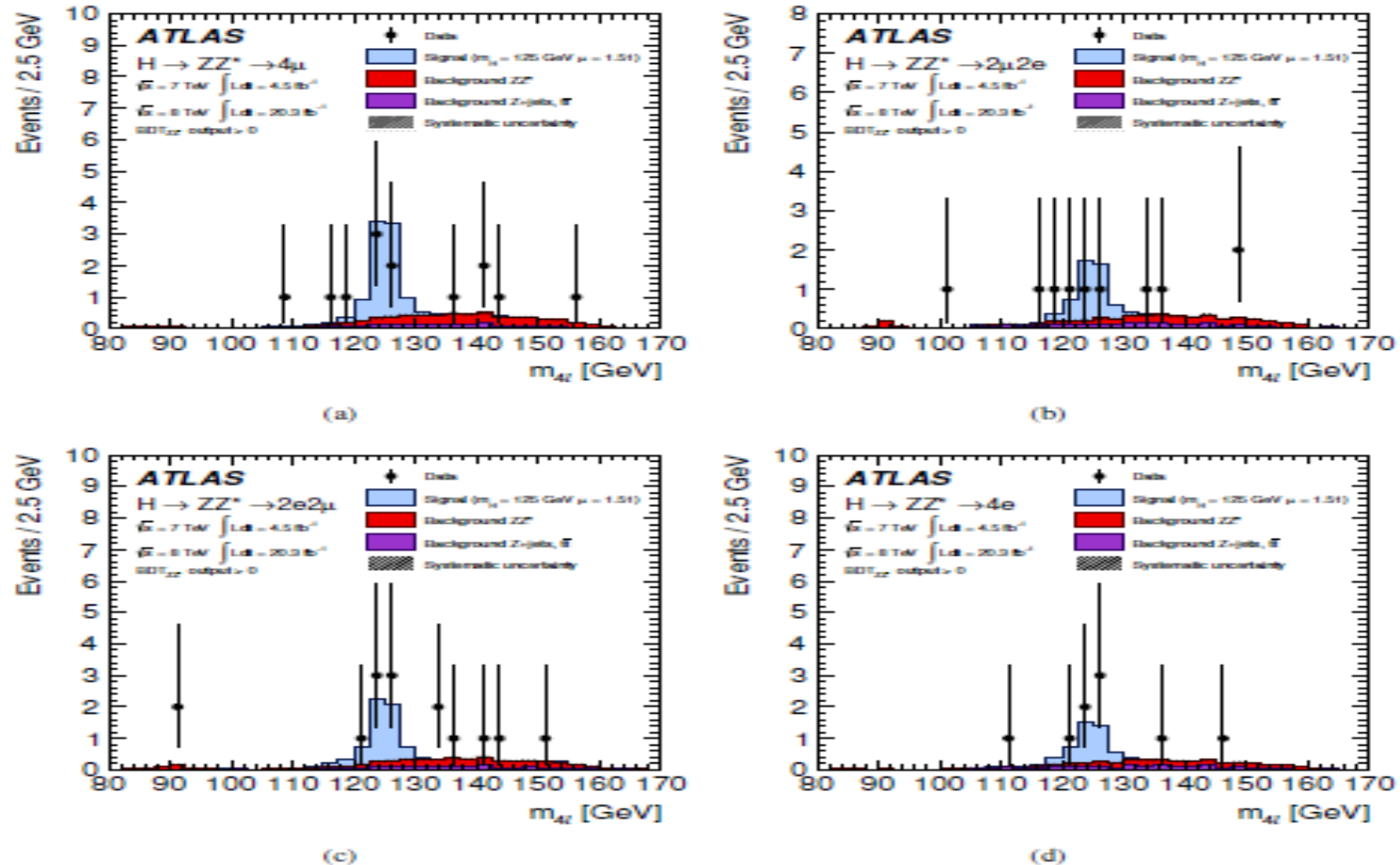
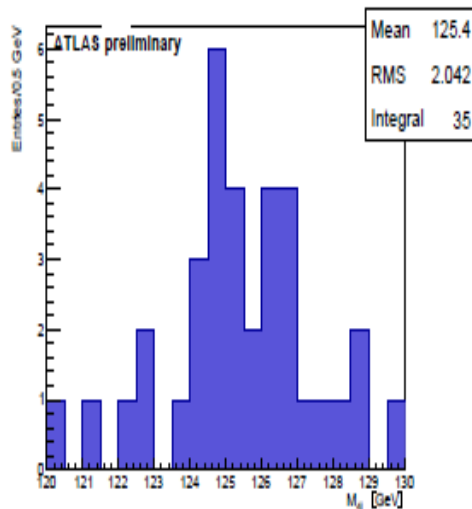


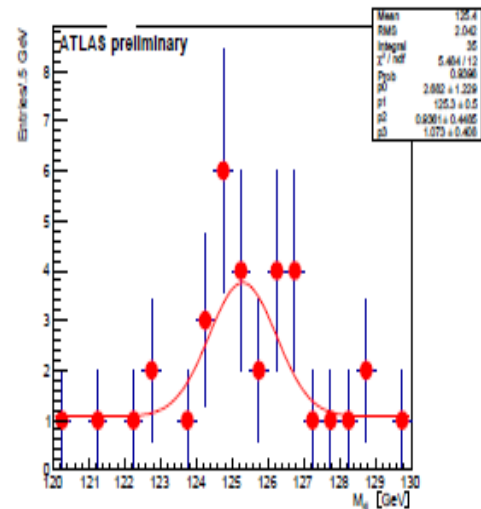
Figure 135:  $m_{4\ell}$  distribution of the selected candidates for  $\sqrt{s} = 7 + 8$  TeV for the different sub-channels of the analysis, compared to the background expectation in the range 80 – 170 GeV only events with a BDT score > 0 are considered: (a)  $4\mu$ , (b)  $2\mu 2e$ , (c)  $2e 2\mu$ , (d)  $4e$ . The contribution of the reducible background is also shown separately.

## 23.12.2013 был показан результат анализа конечных состояний с двумя «мягкими» электронами

Tight electron identification instead of isolation and kinematical ( $P_T$ ) cuts provides clean resonance signal in  $e^+e^-e^+e^-$  and  $\mu^+\mu^-e^+e^-$  states with the efficiency much higher than in the current ATLAS analysis: in a window of size  $\pm 5$  GeV around  $M_{4l}=125$  GeV in publications [1] [2] 12 events were found being compare with 35 events in our analysis. To consider reasons in more details let us have a look an individual influence of cuts in the wide  $M_{4l}$  window (110÷140) GeV.



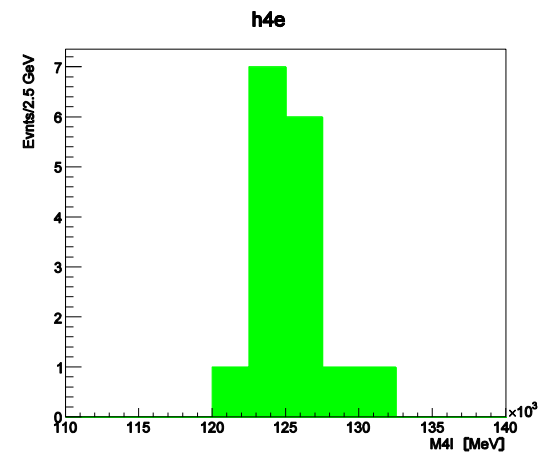
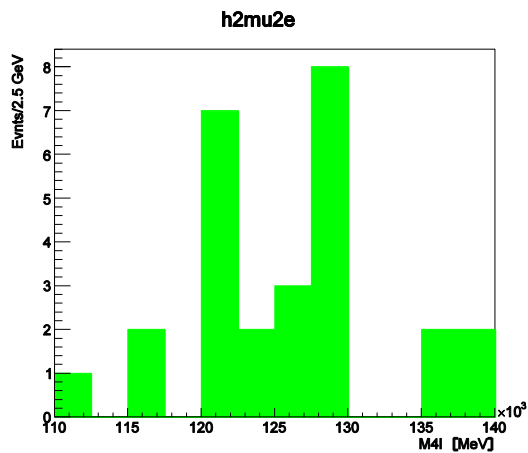
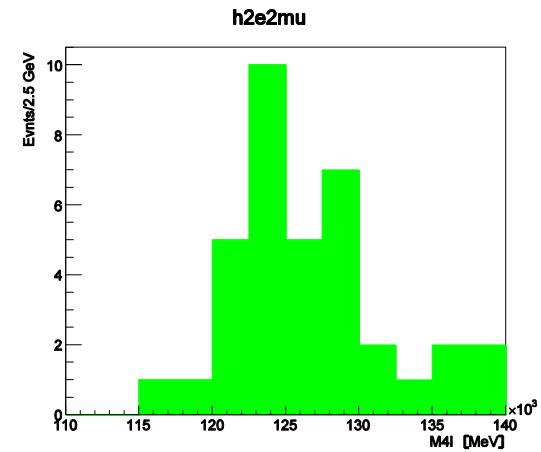
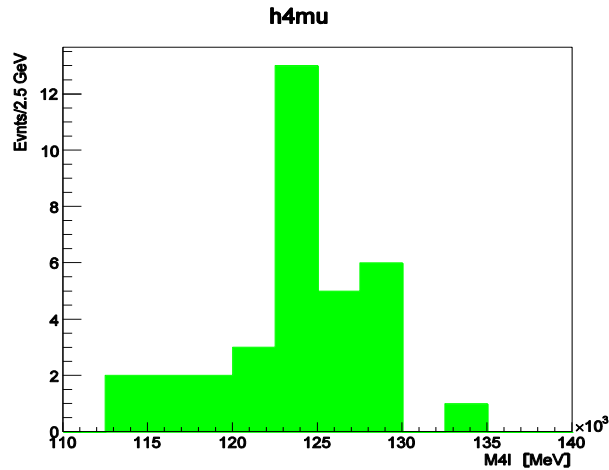
(a)



(b)

# Результаты 25.12.2014

## Фон удалось уменьшить.



Efficiency  $\epsilon$  is estimated with ATLAS standard MC; **Number of events - in the M4I bin(125 $\pm$ 5)GeV;** Background- from sidebands;  
**Expected from theory**

$$Expect = L * \sigma_{th} * Br * \epsilon$$

	$\mu\mu\mu\mu$ (HSG2)	$ee\mu\mu$	$\mu\mu ee$	$eeee$
Efficiency	.547(.45)	.503	.399	.336
Nevnt	27 (12)	27	20	15
Bcg	3.5 (1.5)	4.5	3.5	0.5
Expec	8.0 (6.6)	6.5	5.2	4.8
Obs/theor	2.9 (1.59)	3.5	3.2	2.7

# Significant deviation from SM theory predictions:

$$R = \text{Nobs} / \text{Nth}$$

Official Nobs = 22.9 Nth = 13.8  $R = 1.66 \pm 0.16 \pm 0.17$

Our Nobs = 77 Nth = 24.5  $R = 3.02 \pm 0.12 \pm 0.31$

