

Problem with W transverse mass in invisible Higgs decays

⌘ Problem appears in WH channel

⌘ Not needed for ZH channel

→ preliminary results reported at the May 2002 meeting

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Event selection

Work all done with fortran based ATLFAST

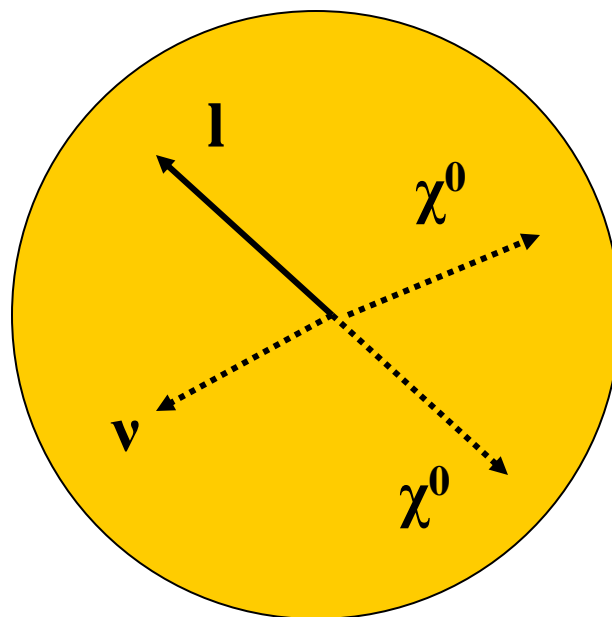
WH selection

- ⌘ large missing p_T
- ⌘ one prompt lepton
- ⌘ max. one jet

Background:

- ⌘ $WZ \rightarrow l\nu \nu\nu$
- ⌘ W incl., $W \rightarrow l\nu$
- ⌘ $t\bar{t} \rightarrow b\bar{b}, W \rightarrow l\nu$

$$\begin{aligned} \text{WH: } H &\longrightarrow \chi^0 \chi^0 \\ W &\longrightarrow l \nu \end{aligned}$$



Production cross-sections

For $m_H = 120 \text{ GeV}$

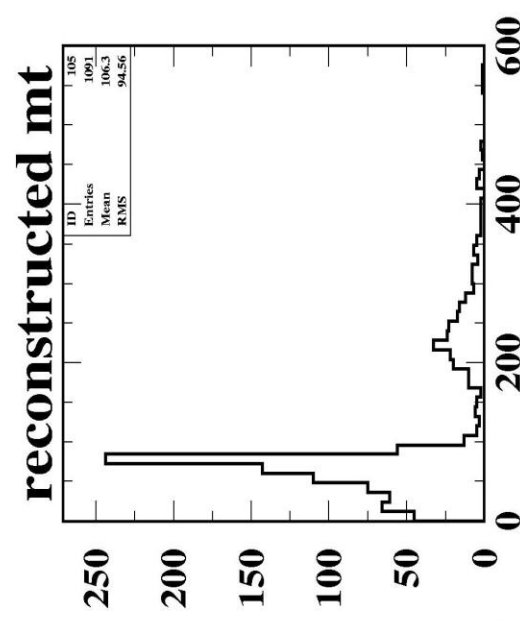
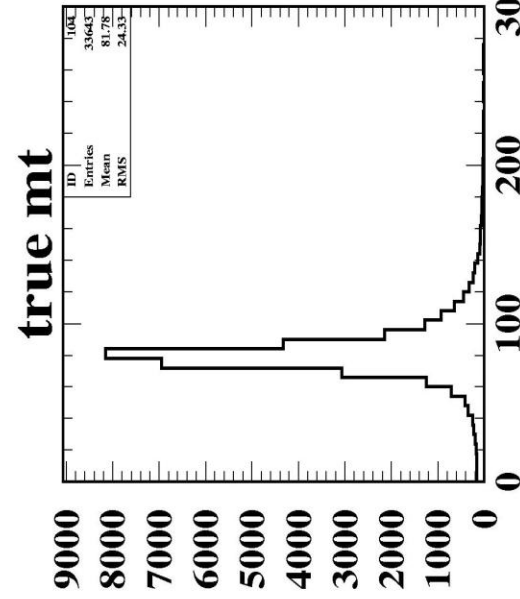
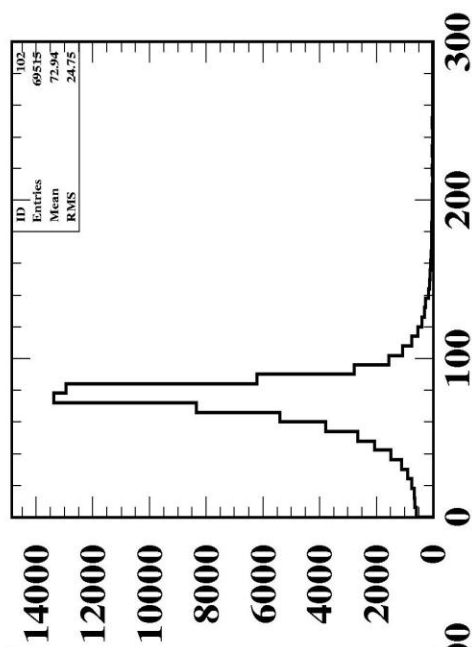
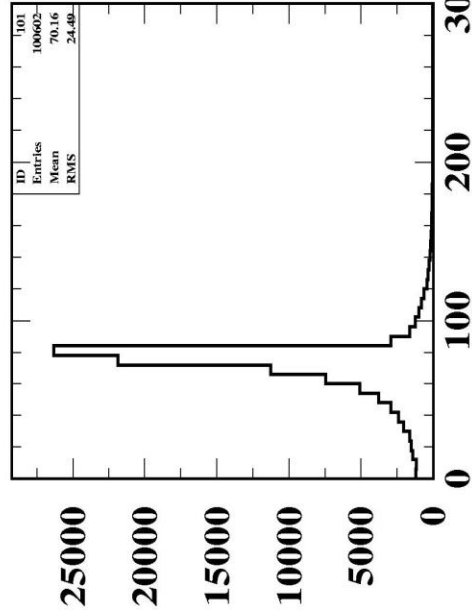
	WH	WZ	W incl	tt
σ (pb)	0.2244	1.055	28540	126.1
#evts @ 10 fb⁻¹	2244	10050	285.4 M	1.261 M
# generated	1.5 M	1.51 M	158.4 M	59.16 M

**W incl. background five orders of magnitude larger
... but should disappear with a transverse mass cut
(see Physics TDR p. 546)**

Transverse mass in W decays

$$m_T = [2 p_T^l p_T^{\nu} (1 - \cos \phi)]^{1/2}$$

For 155 million generated W incl events



after ptlep and njet cuts

after ptmiss cut

Signal is completely lost:

182 WH events vs

28032 W incl. events after p_T miss cut (10fb^{-1})

Checks done so far:

- ⌘ Problem also seen at parton level
- ⌘ Used Elzbieta's code as a cross-check
- ⌘ All events are $W \rightarrow l\nu$
- ⌘ Same number of electrons and muons

Need some new ideas!