

Weekly Report

Shuiting Xin

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Real lepton efficiency

Real lepton-enriched CR	
Njets	≥ 1
Nbjets	0
Lepton charge	OS
Lepton favour	ee,uu
Lepton offline selection	Loose definition
pt	$> 20 \text{ GeV}$
Trigger-matched	Single and di-lepton trigger
mll	$80 \leq m_{ll} \leq 100$

Tag & Probe method

ATL-COM-PHYS-2017-907

$$\varepsilon_r(e, u) = \frac{N_i^{T(e,u)} - N_{bkg}^{T(e,u)}_i}{N_i^{L(e,u)} - N_{bkg}^{L(e,u)}_i} \sim \frac{N_{TT}}{N_{TL}}$$

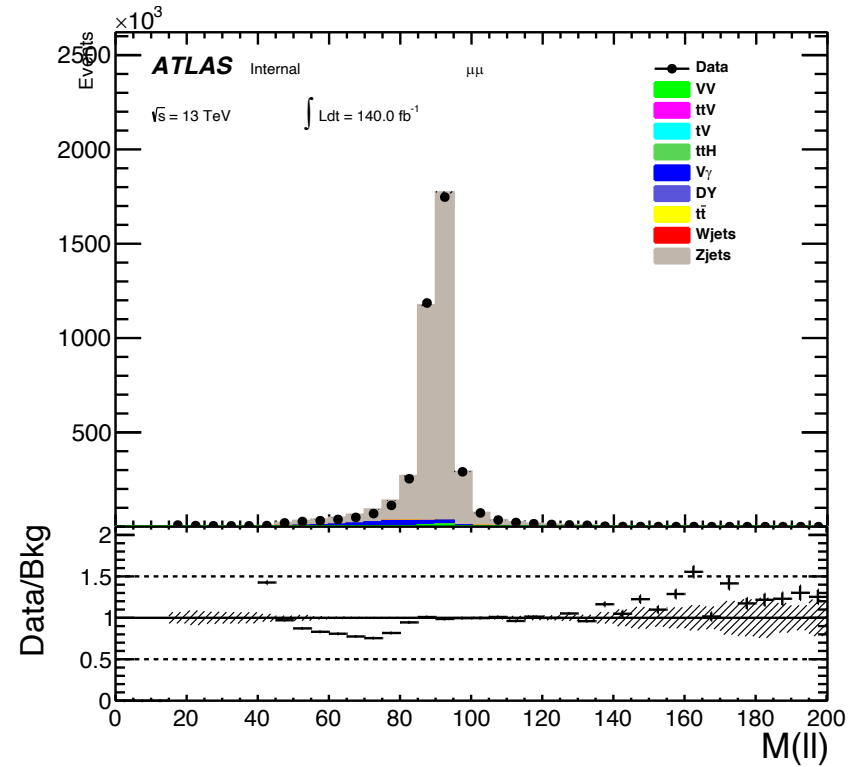
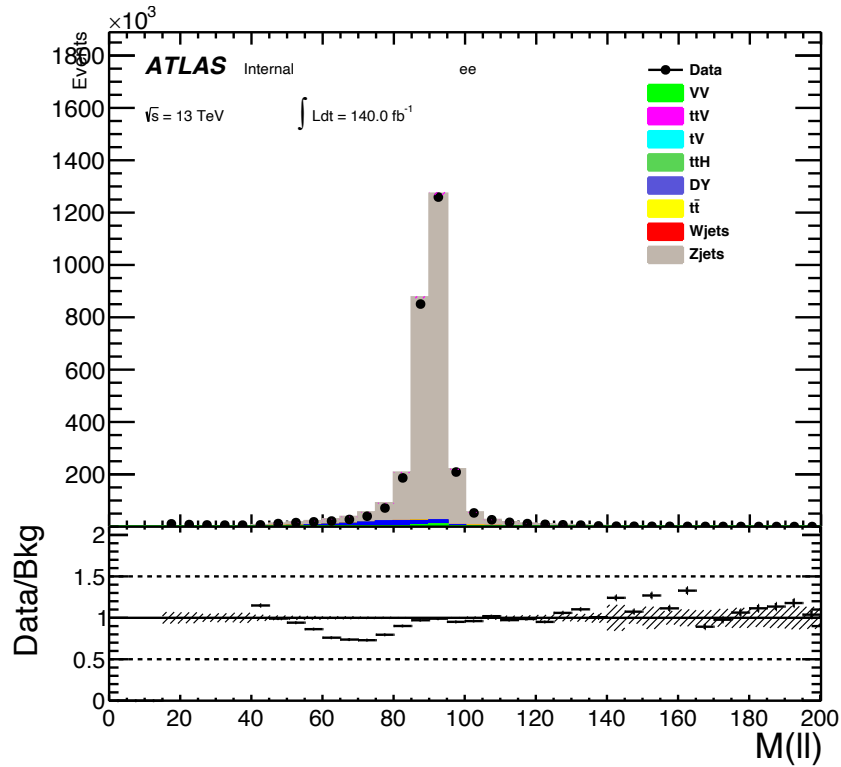
Background to be subtracted : OS fake lepton from ttbar, ignore for now

Alternative CR

	<i>Real</i> lepton-enriched CR
N_{jets}	2,3
$N_{b-tag\ jets}$	≥ 1 (MV2c10, 70% eff.)
N_ℓ	2
lepton charge	OS
lepton flavour	$e\mu, \mu e$
lepton offline sel.	L (62)
p_T^ℓ	≥ 20 GeV (15 GeV for $3\ell 0\tau$)
$\eta(e)$	≤ 2.0
$\Delta R(\ell, \ell)$	≥ 0.5
$M_{2\ell SS}$	≥ 12 GeV
trigger	<code>HLT_mu20_loose_L1MU15 HLT_mu26_ivarmedium HLT_mu50 </code> <code>HLT_e24_lhmedium_L1EM20VH HLT_e60_lhmedium </code> <code>HLT_e120_lhloose </code> <code>HLT_e26_lhtight_nod0_ivarloose HLT_e60_lhmedium_nod0 </code> <code>HLT_e140_lhloose_nod0</code>
nr. trigger-matched ℓ	≥ 1

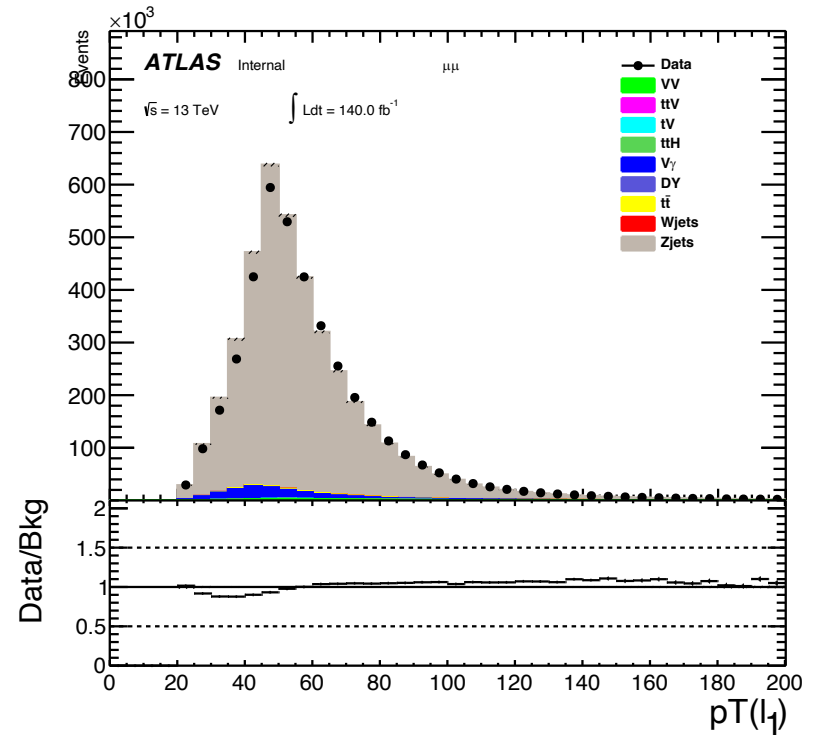
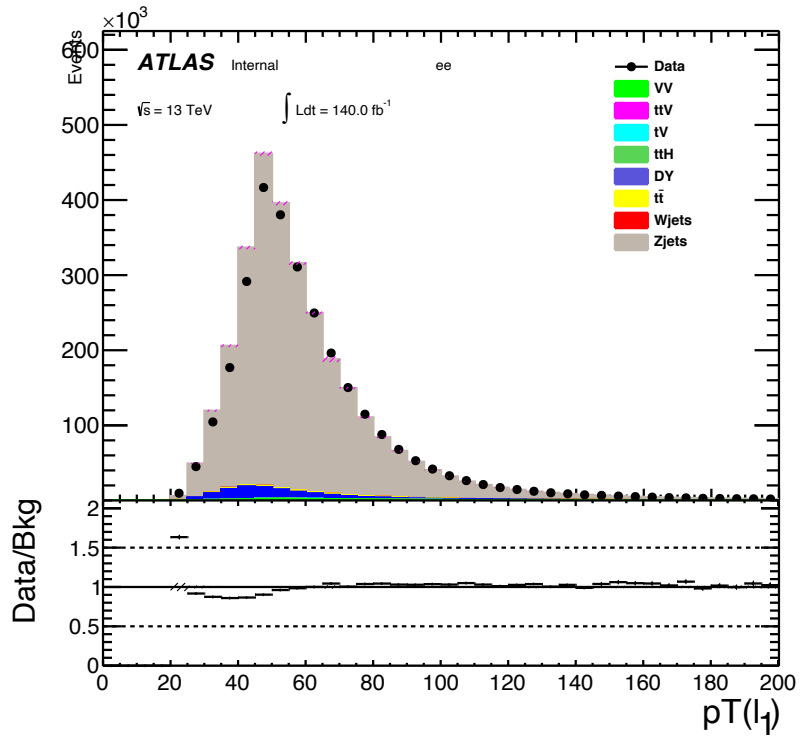
- Instead of typical Z peak region, they define real CR to be enriched in prompt leptons from $t\bar{t}$ decay

CR distribution(36.1-1fb)



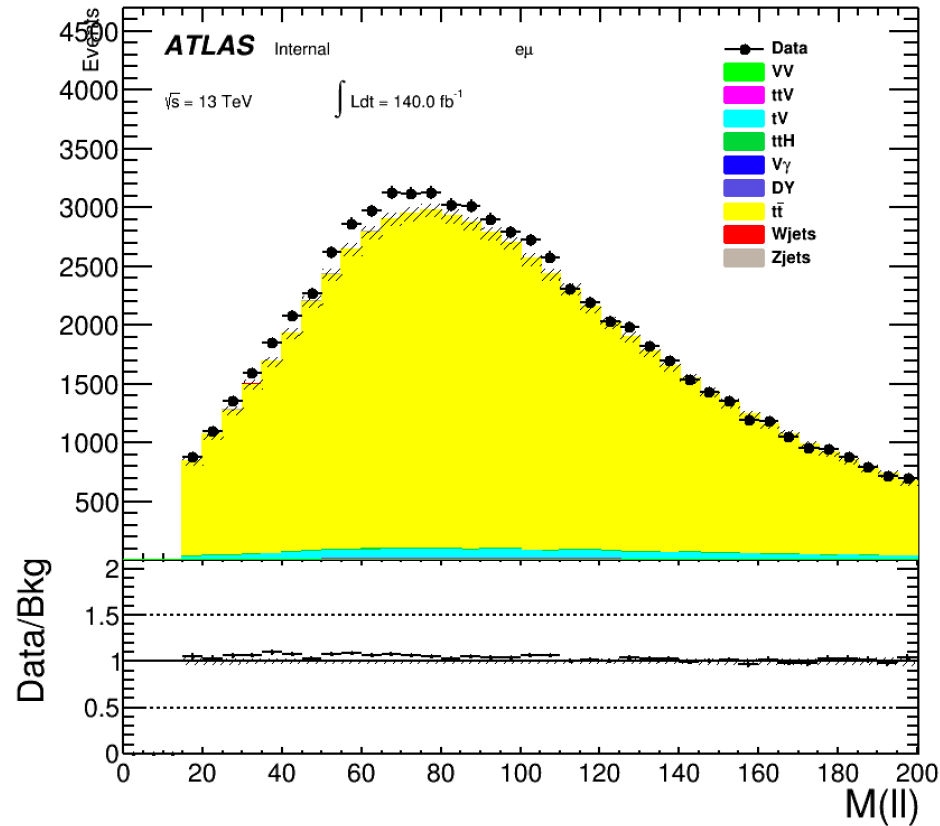
Long tail around 60-80 GeV?

CR distribution(36.1-1fb)



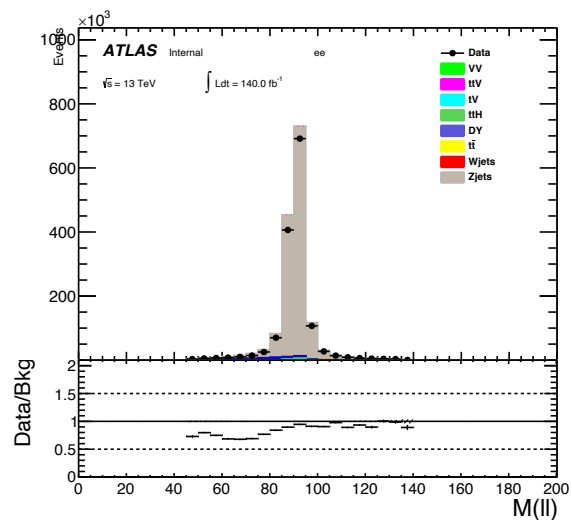
Mismatched is also observed in previous paper

TTbar enriched region

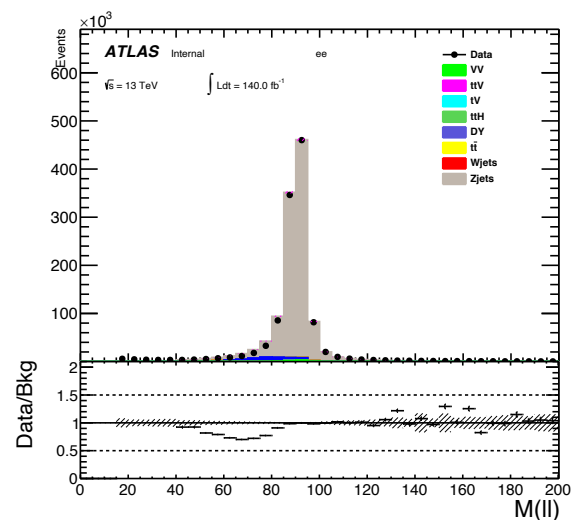


- Seems this CR has better description on data

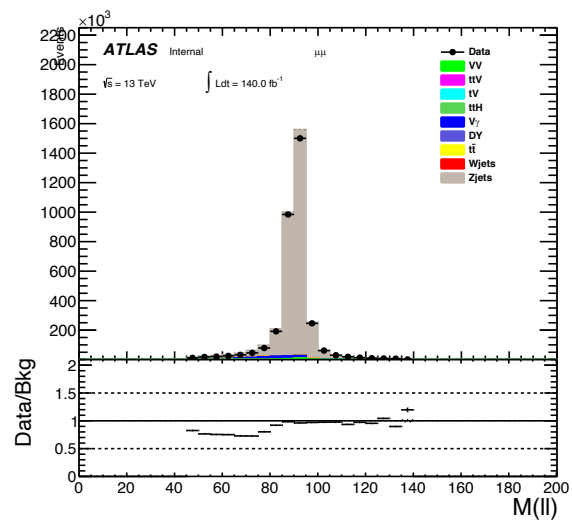
Distribution of tag/probe lepton



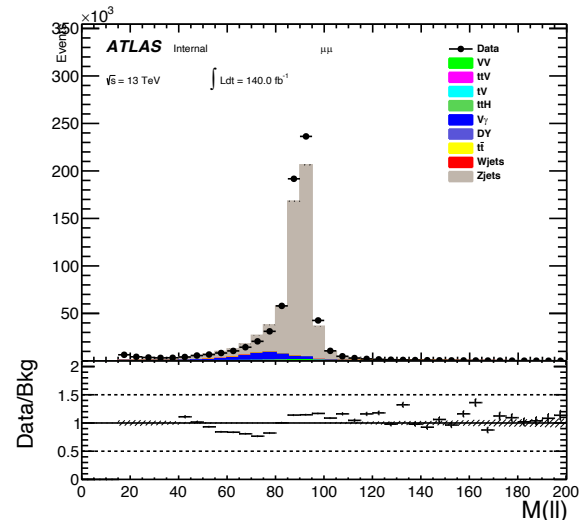
$T_e T_e$



$T_e T_e$

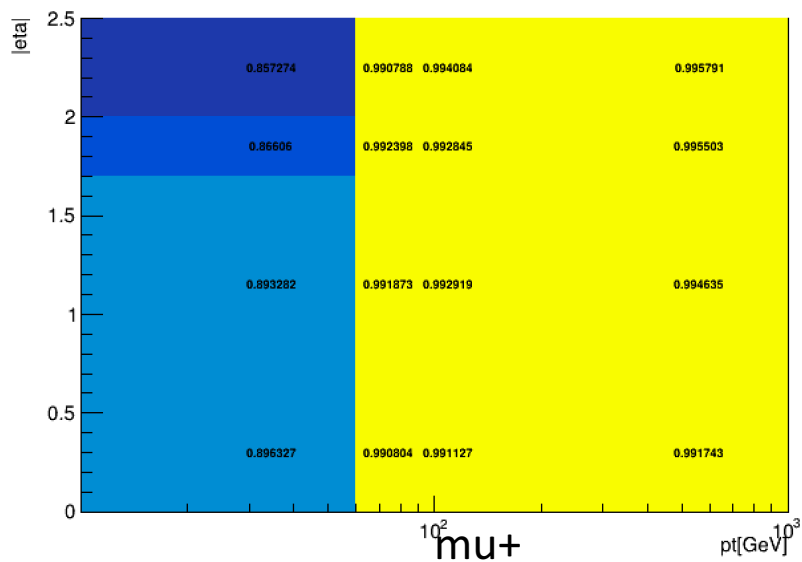
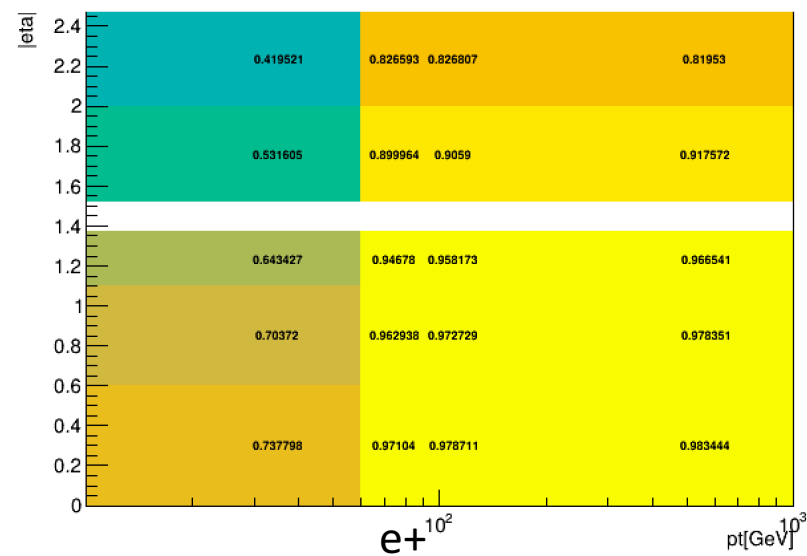
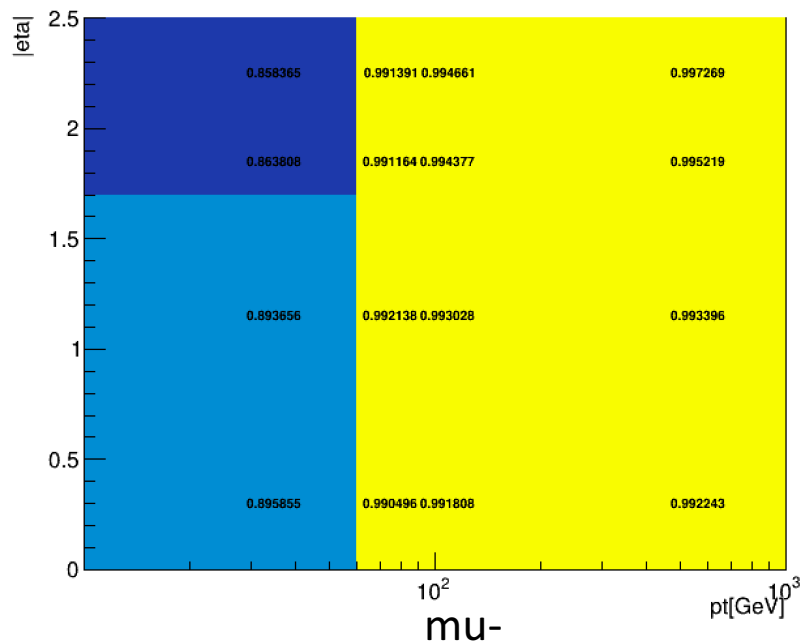
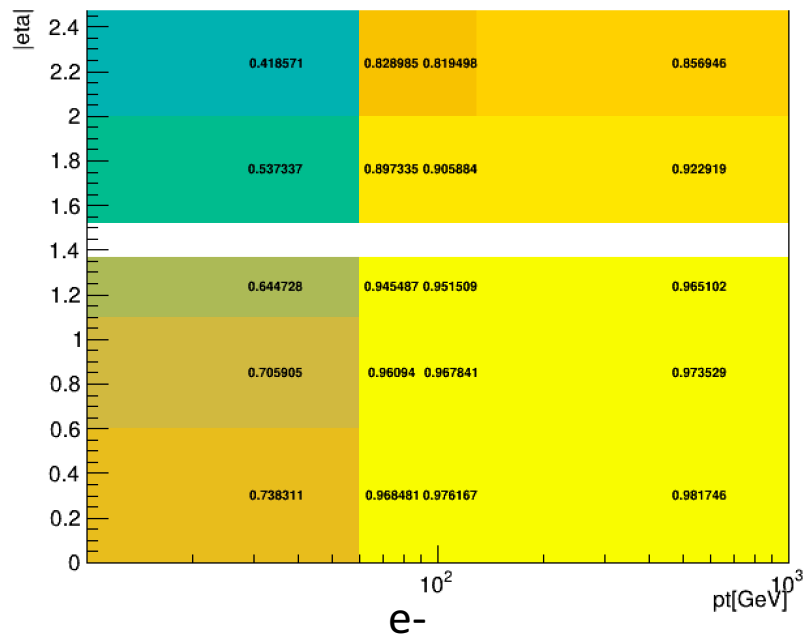


$T_\mu T_\mu$



$T_\mu T_\mu$

Results



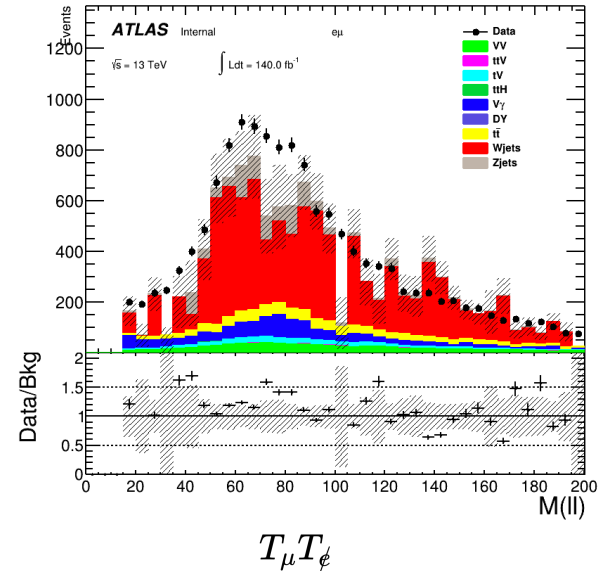
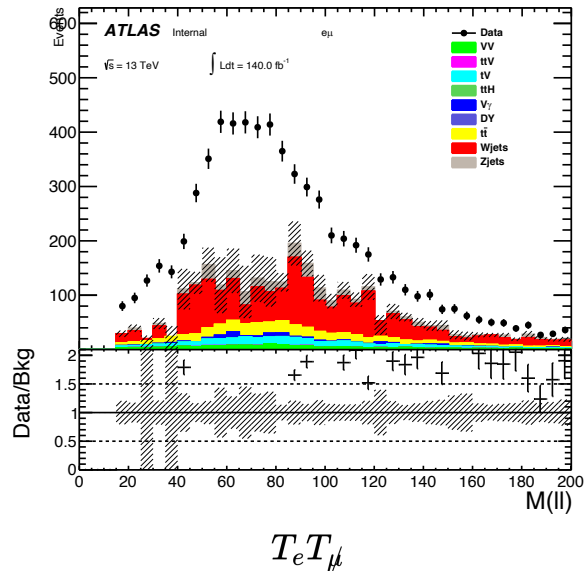
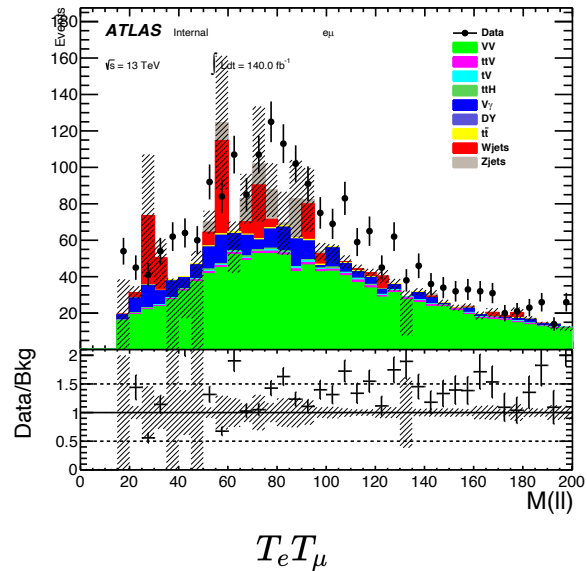
Fake lepton efficiency

Real lepton-enriched CR	
Njets	1,2
Nbjets	0
Lepton charge	SS
Lepton flavour	eu
Lepton offline selection	Loose definition
pt	>20GeV
Trigger-matched	Single and di-lepton trigger

$$\varepsilon_r(e, u) = \frac{N_i^{T(e,u)} - N_{bkg}^{T(e,u)}}{N_i^{L(e,u)} - N_{bkg}^{L(e,u)}} \sim \frac{N_{TT}^{Data} - N_{TT}^{PromptSS}}{N_{TL}^{Data} - N_{TL}^{PromptSS}}$$

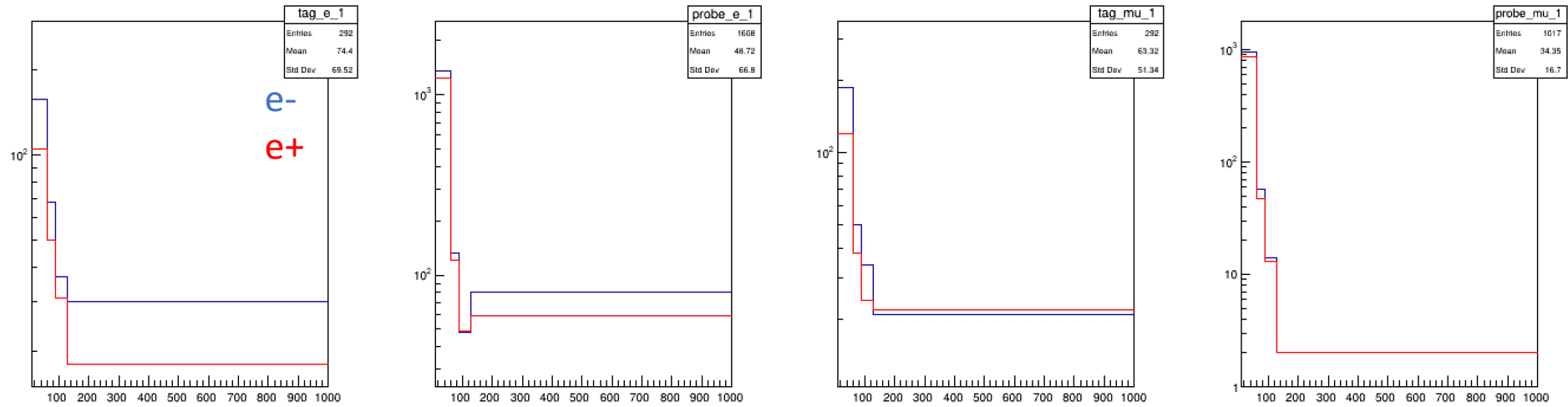
PromptSS: real lepton from diboson, ttV, ttH, tV (exclude ttbar and V+jets)

Distribution of tag/probe lepton

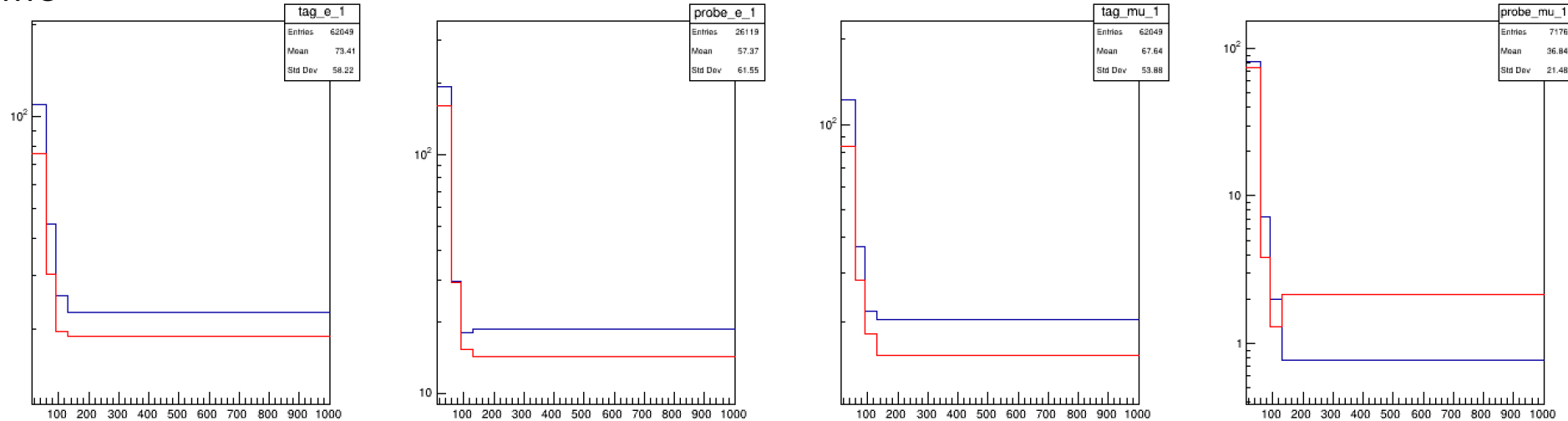


Tag and probe lepton for Data and MC

Data

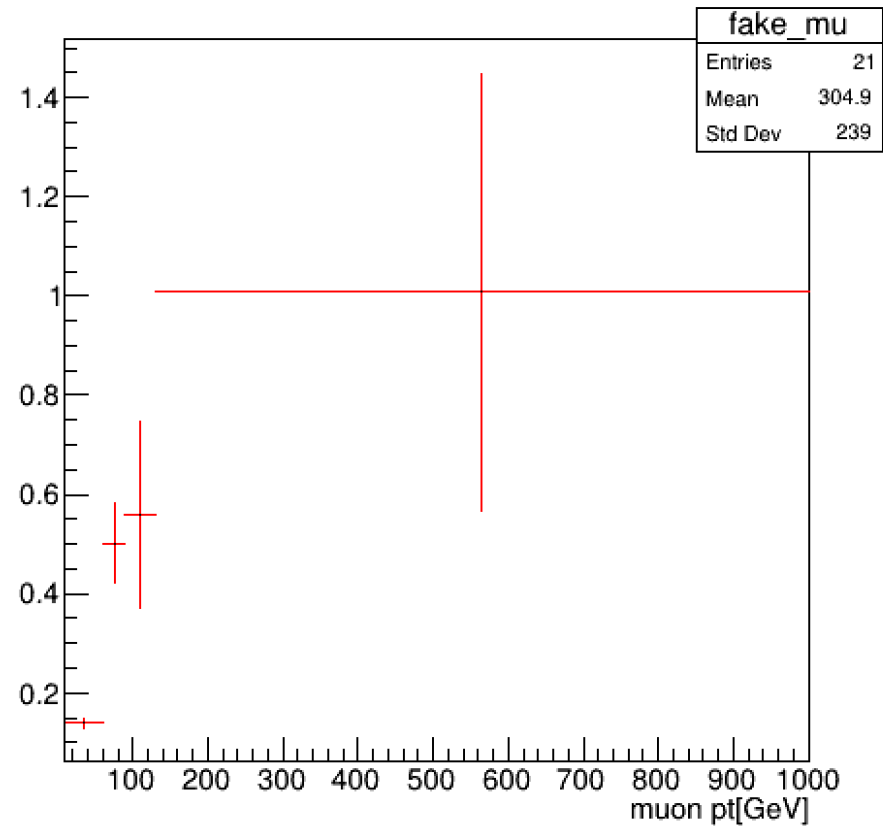
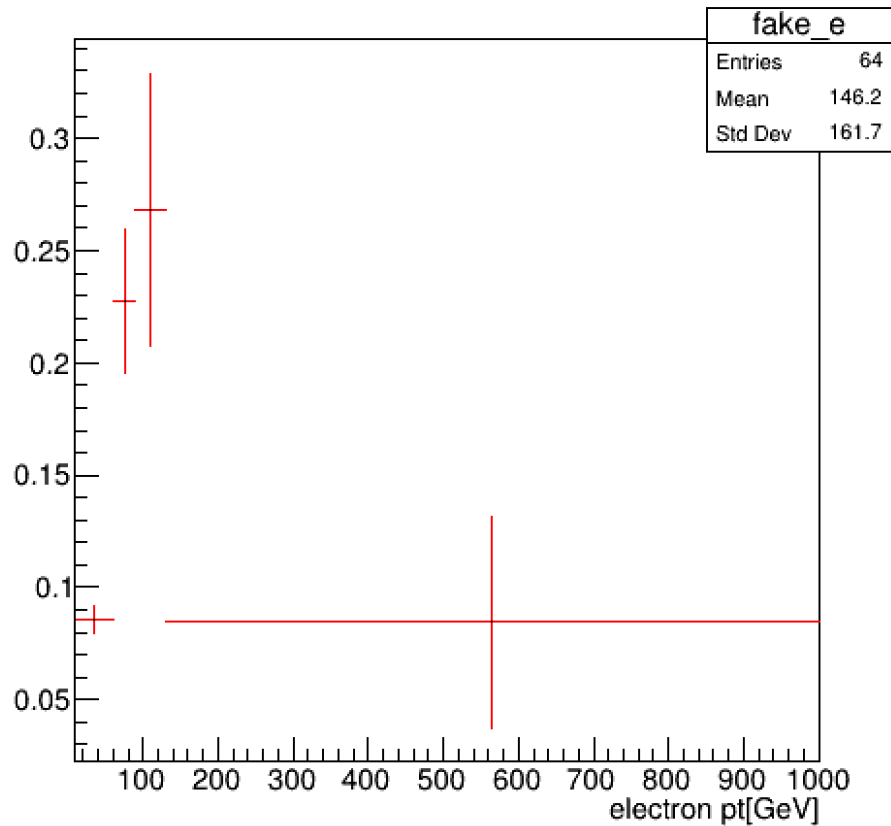


MC



$$\varepsilon = \frac{N_{tag}^{Data} - N_{tag}^{MC}}{N_{tag}^{Data} + N_{probe}^{Data} - N_{tag}^{MC} - N_{probe}^{MC}}$$

Results



Strange value for high muon pt