

Backgrounds impact on Tag&Probe efficiencies

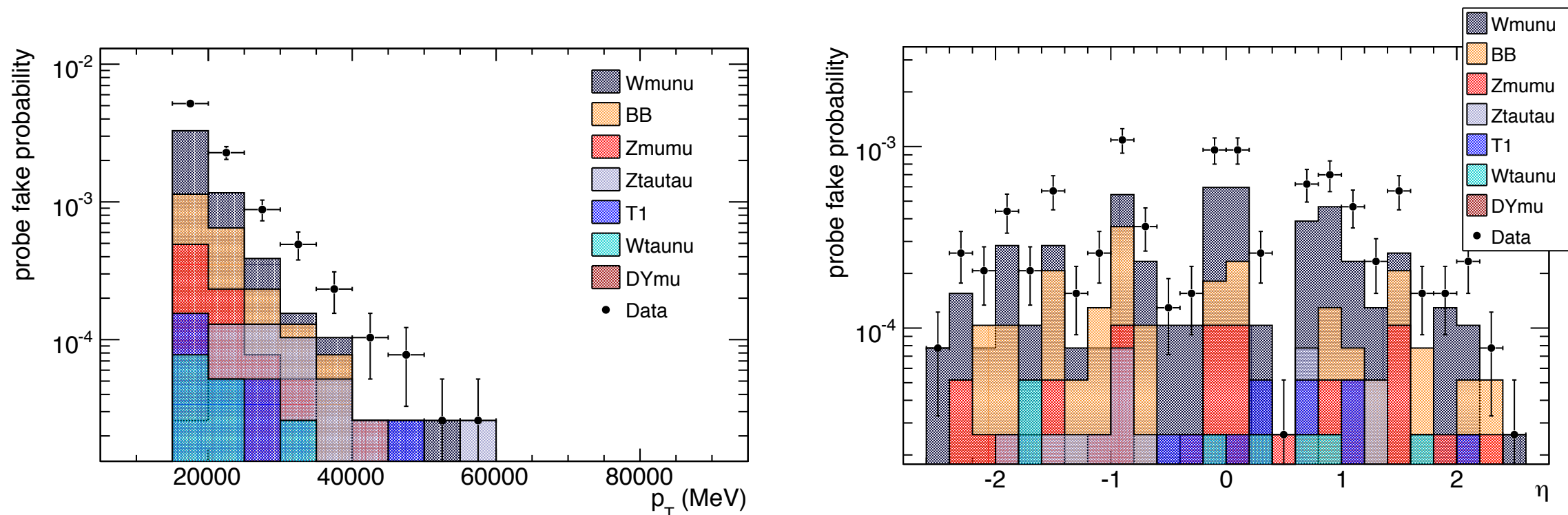
- Data for 50 pb⁻¹: efficiency of Muon Spectrometer wrt to Inner Detector

★ fake probes¹ give major impact here, other efficiency terms are done wrt this

¹fake means not associated with a truth muon within a 0.05 dR cone

Sample	probe/pb ⁻¹	ϵ_{probe}	ϵ_{MC}	tot fake %	proc fake %
Data	773	94.6	-	0.9	-
$Z \rightarrow \mu\mu$	754.2	95.4	95.9	0.09	0.1
$W \rightarrow \mu\nu$	4.2	6.6	-	0.52	94.8
$Z \rightarrow \tau\tau$	2.1	79.0	-	0.05	19.0
$W \rightarrow \tau\nu$	0.1	14.3	-	0.02	85.7
$t\bar{t}$	2.4	83.6	-	0.03	9.8
$BB\mu\mu$	2.9	34.0	-	0.23	60.4
$DY\mu\mu$	7.0	95.4	-	0.00	0.0

★ tracks localized at low p_T and in critical η regions



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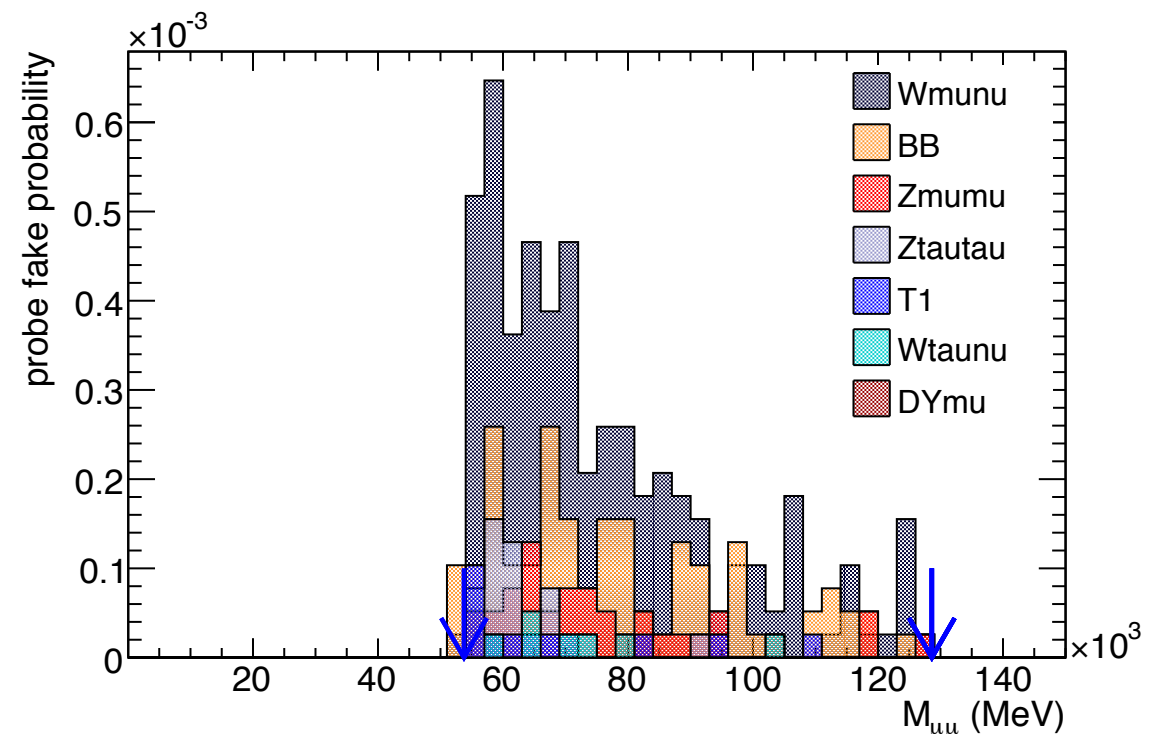
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★ Tag-probe invariant mass cut still to be tuned

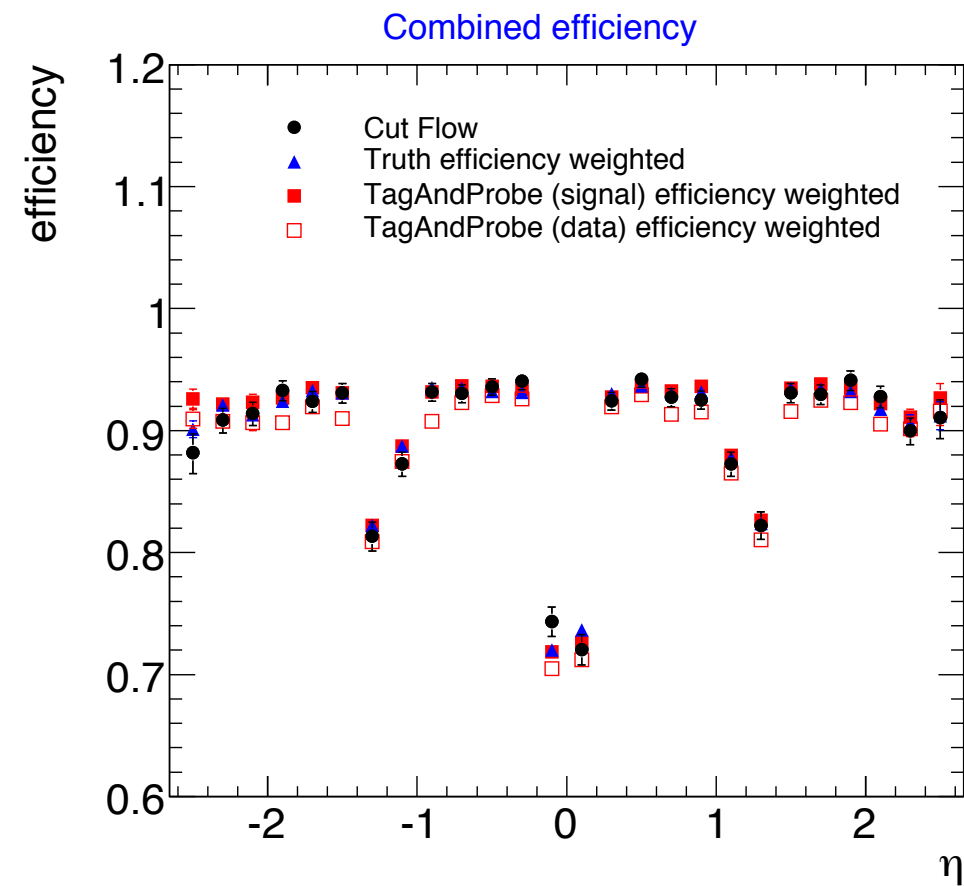
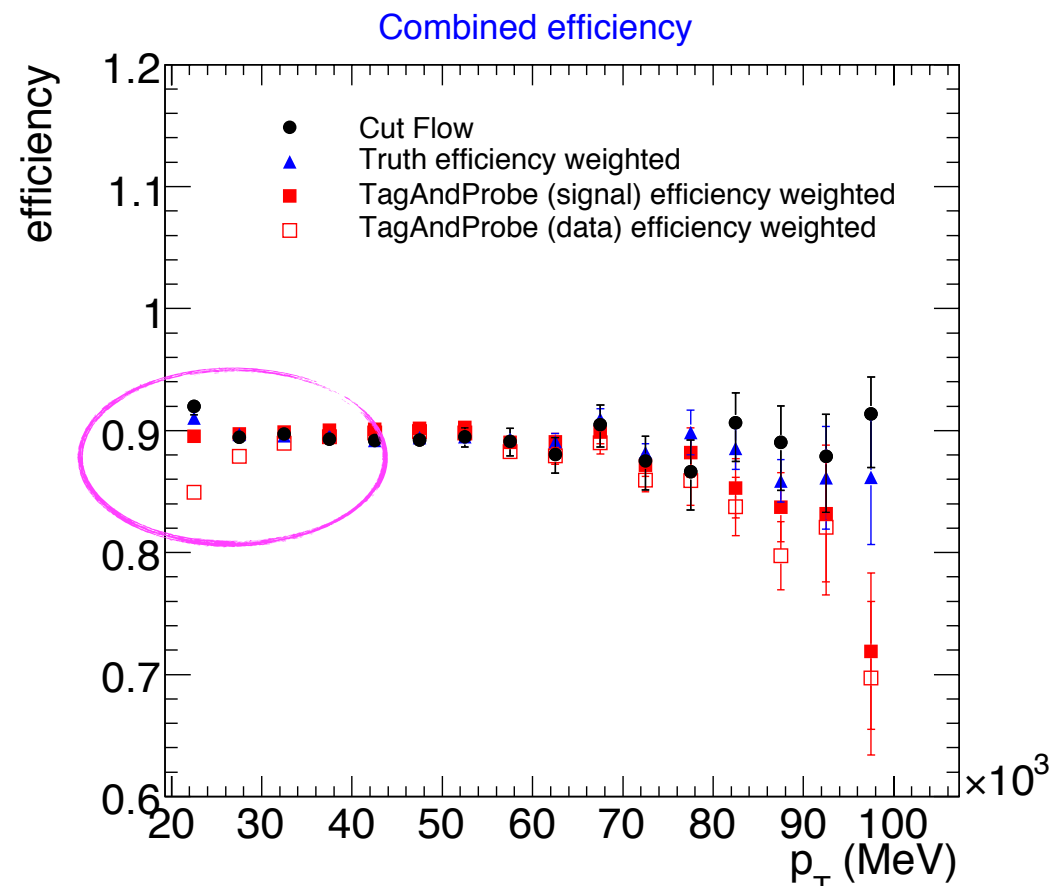
— now takes up to 15 Γ_Z

★ Tightening cut to 10 Γ_Z can help to excluded first 4-5 fake bins



Backgrounds impact on Tag&Probe efficiencies

- Testing effect of backgrounds on cut-flow efficiency estimation on $Z \rightarrow \mu\mu$
 - ★ weighting MC kinematics with efficiency maps built from signal only and from “data”

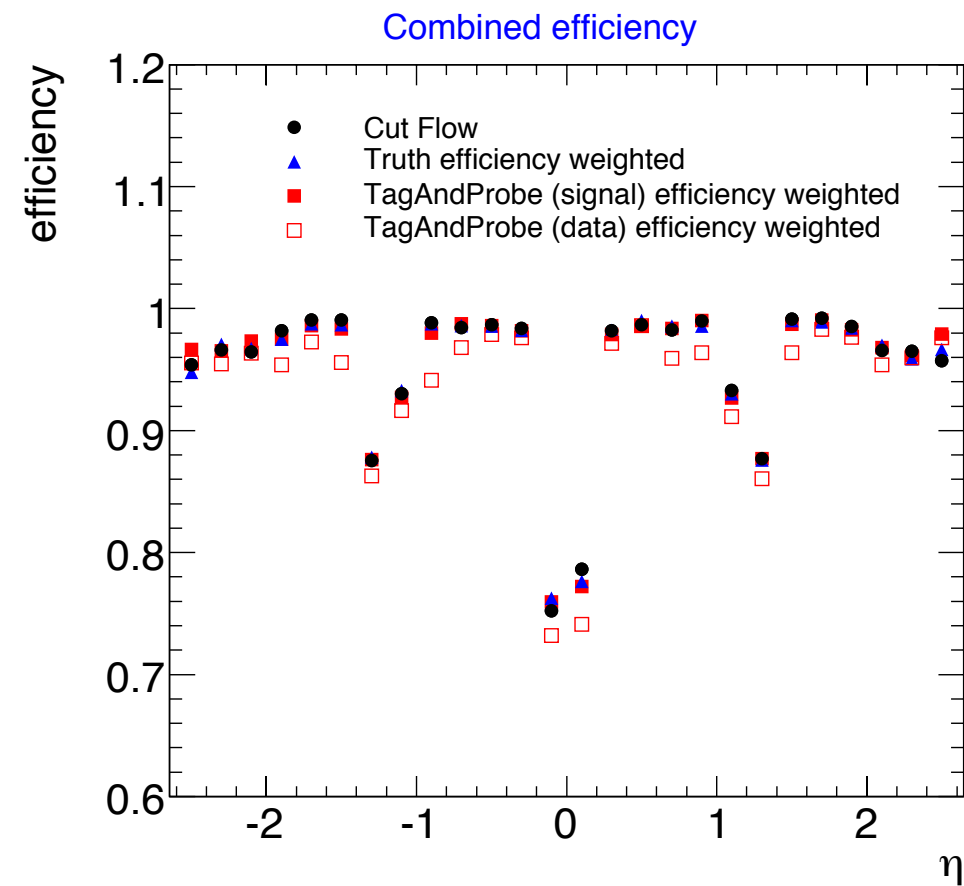
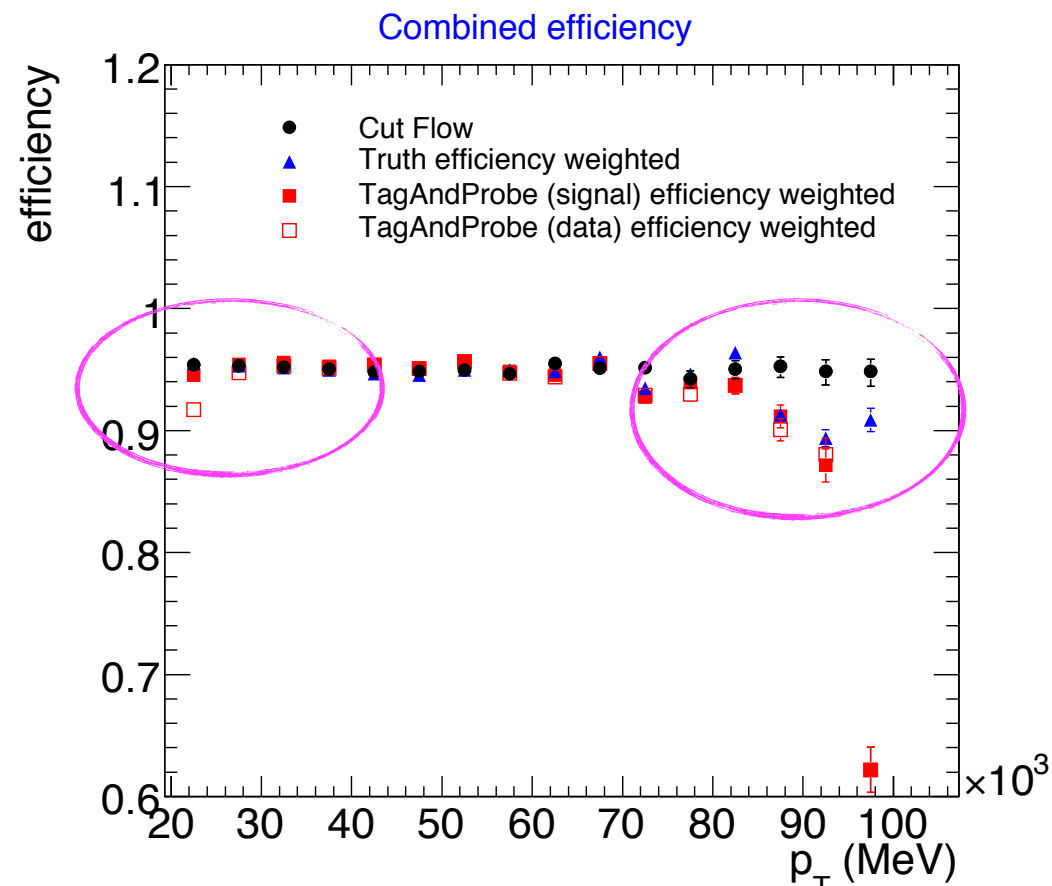


- ★ low efficiency at low p_T as expected

Method	$\epsilon(sel)$ (%)	$\delta\epsilon/\epsilon(sel)$ (%)
Cut Flow	38.64 ± 0.21	
Truth efficiency weighted	38.85 ± 0.21	0.53 ± 0.76
Tag&Probe (signal) efficiency weighted	38.84 ± 0.21	0.52 ± 0.76
Tag&Probe (“data”) efficiency weighted	38.04 ± 0.21	-1.56 ± 0.75
Tag&Probe background effect	data-signal/signal = -2.08 ± 0.75	

Backgrounds impact on Tag&Probe efficiencies

- Testing effect of backgrounds on cut-flow efficiency estimation on $W \rightarrow \mu\nu$
 - ★ weighting MC kinematics with efficiency maps built from signal only and from “data”



- ★ low efficiency at low p_T as expected and high p_T due to empty/low stat map bins
 - empty/low stat bins to be corrected taking macro-bins (or apply a upper bound on p_T)

Method	$\epsilon(sel)$ (%)	$\delta\epsilon/\epsilon(sel)$ (%)
Cut Flow	44.97 ± 0.07	
Truth efficiency weighted	44.68 ± 0.07	-0.64 ± 0.22
Tag&Probe (signal) efficiency weighted	44.56 ± 0.07	-0.91 ± 0.22
Tag&Probe (“data”) efficiency weighted	43.69 ± 0.07	-2.85 ± 0.21
Tag&Probe background effect	data-signal/signal = -1.96 ± 0.22	

Effect of Z+jets events on isolation efficiency

- mappa in pt,eta

