Simulation of the background for analyses with ew-penguin.

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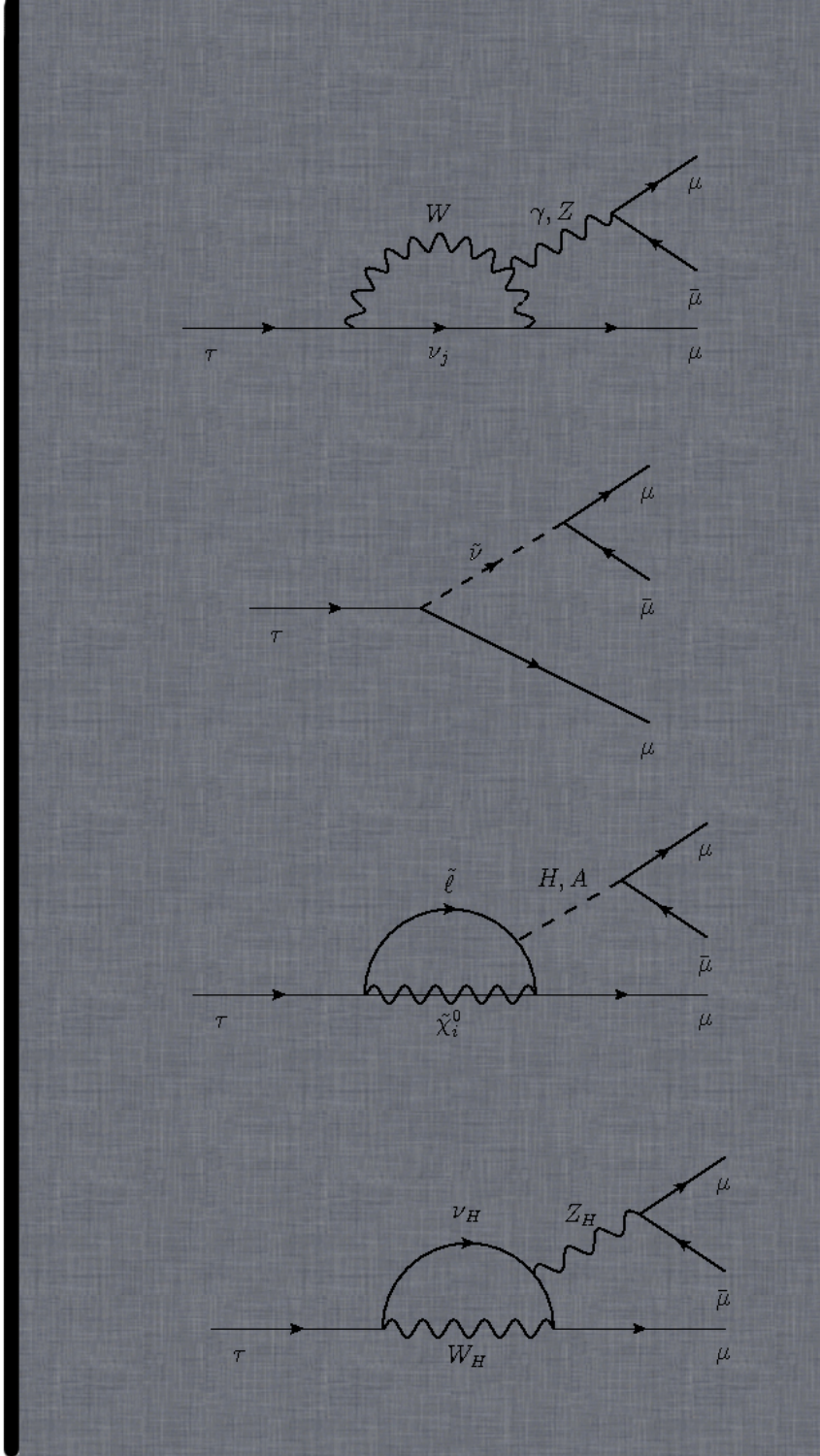
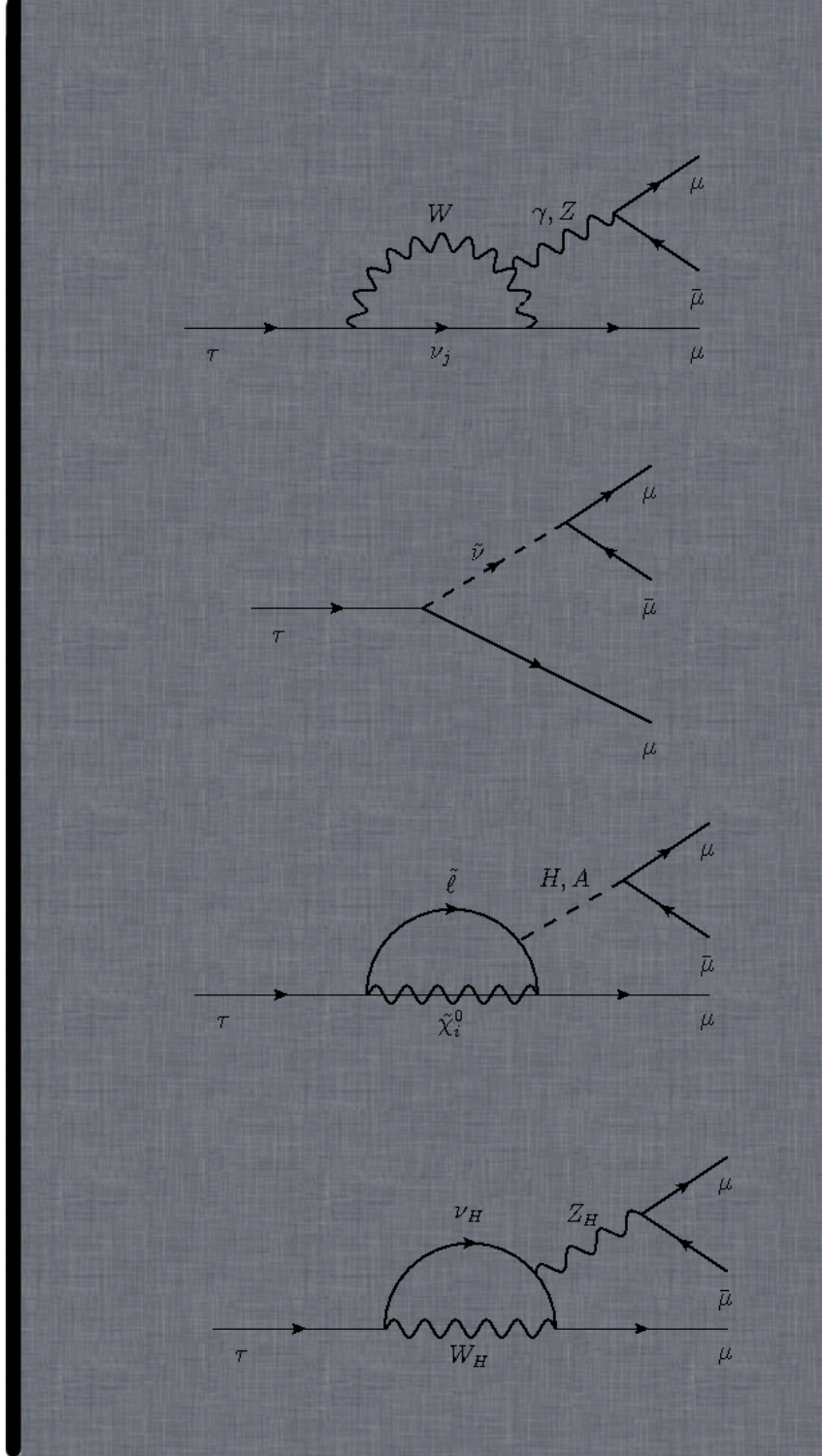


Quo Vadis $\mathrm{B} \to \mathrm{K}^* \mu\mu$

MC generator cuts



Quo Vadis $\mathrm{B} \to \mathrm{K}^*\mu\mu$

- We would like to propose to generate MC bck in order to address the following issues:
  1. Background for which the invariant mass and the angular distributions are correlated (we have been working on the assumption that these backgrounds are negligibly small). Ex. $\mathrm{B} \to \mu X \mathrm{D}(\mu X)$.
  2. Stripping could be improved by using a Multivariate technique, the main inefficiency comes from a lifetime cut.
- A possible solutions to the following issues:
  1. Look for backgrounds using a large sample of MC background.
  2. For next round of stripping we would like to prepare a stripping based on MVA to gain a bit on efficiency.

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Improving the selection

- Till now BDT was trained on data using $\mathrm{B} \to \mathrm{K}^{*}\mathrm{J}/\psi$.
- Can not use this for stripping because it already passed the stripping ☺
- Plan would be use MC to train MVA that would be used in February for stripping.
- This could really buy us sensitivity. Need to keep in mind that CMS in 2012 re-optimised the trigger for this channel.
- We should make the most of our data.

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Background

C.Bovee

"We fear things in proportion to our ignorance of them."

- We never verified the background composition with a large MC production, we believe it should be done for the next analysis
- If we have some exponentially leaking bck this could easily mess up our distribution of angles.
- If we had a sample of $\sim 0.5 fb^{-1}$ this could give us an first idea of if can sleep at night.
- I am now concentrating on K*mm, but the same arguments can be made for $\sim$ all EW penguin analysis

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MC generator cuts.

- Following approach from $\tau \to 3\mu$, one can put some generator level cuts to gain on the efficiency.

DiMuon MC			
$\tau \to 3\mu$		EW	
$p_{t\mu}$	$> 290 MeV$	$p_{t\mu}$	$> 0 MeV$
p_{μ}	$> 2.9 GeV$	p_{μ}	$> 2.9 GeV$
$M(\mu\mu)$	$< 4.5 GeV$	$m(\mu\mu)$	$< 5.1 GeV$
DOCA$(\mu\mu)$	$< 0.35 mm$	DOCA$(\mu\mu)$	$< 0.30 mm$

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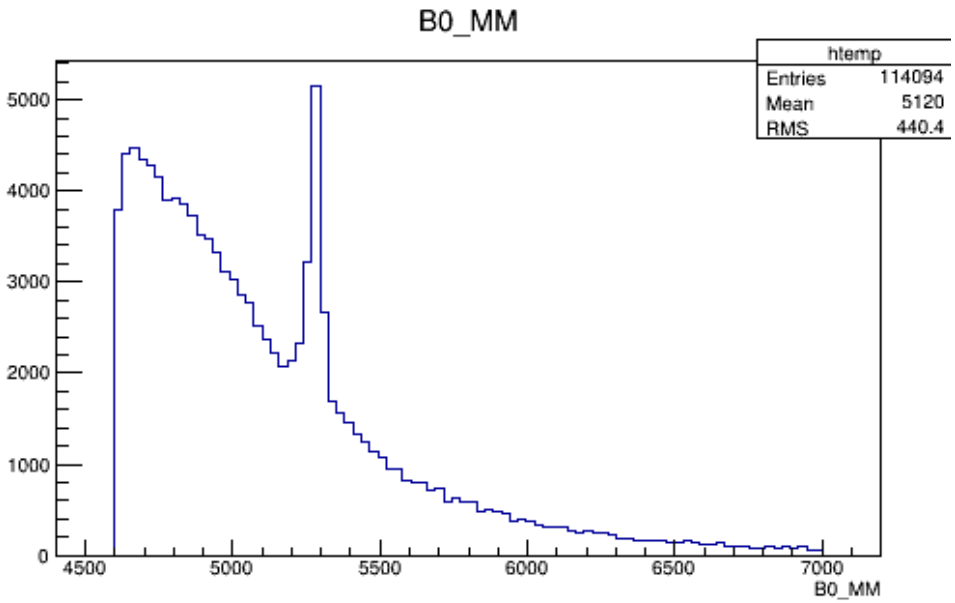
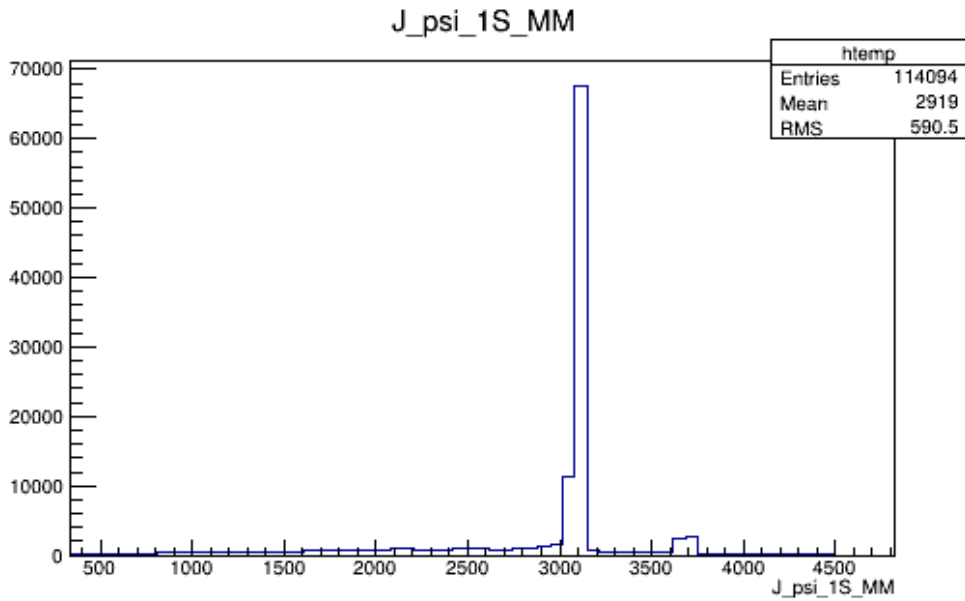
Is MC useful?

- Based on just $12 pb^{-1}$ of cuts specific for $tau \rightarrow 3\mu$:





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Our proposal

- The purpose of this talk is to provoke discussion (that probably will continue offline) and see if people agree on the usefulness of this sample, we are convinced it is extremely important for K*mm and the other EW analyses but also few other rare decays might profit from it.
- Take the proposed generation cuts as a draft proposal, of course we are very open to discussions. We already thought about:
  1. Veto J/ψ.
  2. P_t cut on only one μ.
  3. Only opposite μs
  4. Any smart ideas?
- but if possible we have the gut feeling this sample should be as unbias as possible
- We would ask for 2 samples:
  1. $\sim 20M$ of "pure" MC, or with dummy stripping.
  2. Rest with filtered production.

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