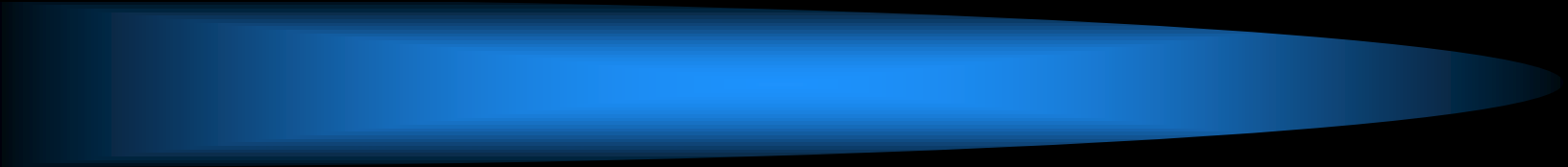


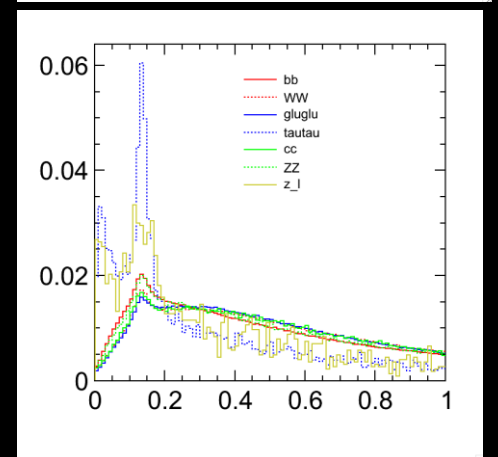
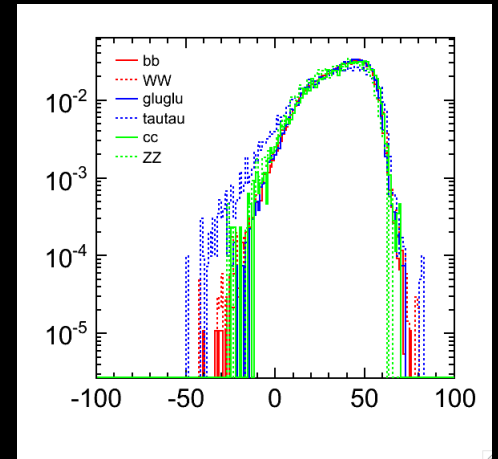
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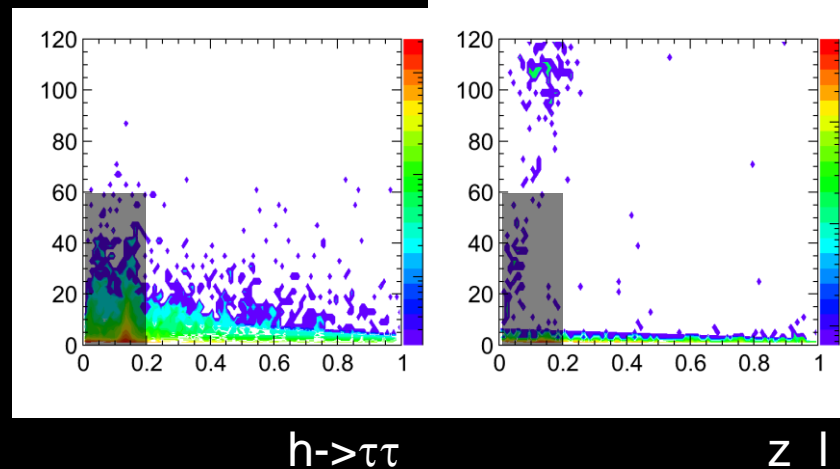
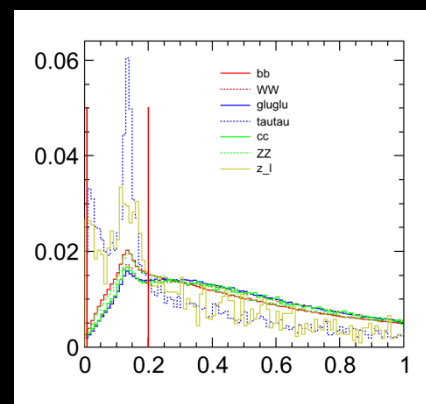
$h \rightarrow \tau\tau$ bias

- dPTbal cut has bias for $h \rightarrow \tau\tau$ mode.
- Photons from π^0 decay seems to be reason why such bias exists.
- Bottom figure shows the invariant mass of any 2 photons about major higgs decay mode, and $\tau\tau$ mode's peak nearly m_π is sharper than other modes.



photon selection

- For calculation of $dPT_{bal} = PT_{dI} - PT_{\gamma}$, it is effective for reducing $h \rightarrow \tau\tau$ bias to not use photons whose invariant mass (with any another photon) is nearly m_{π} .
- Unfortunately, if I use photon selection for dPT_{bal} , the BG rejection will be quite worse.
- Since photons of Z leptonic decaying BG tend to have energy larger than 60 [GeV], I try to add condition for restriction of using photon of calculation dPT_{bal} .
 - ➔ Don't use photon whose invariant mass is within (0.01, 0.2) and whose energy smaller than 60[GeV].



3 types for checking photon selection

- Type “甲”
 - ◆ $\delta PT_{\text{bal}} < -10, 10 < \delta PT_{\text{bal}}$
 - ◆ $M_{\text{ll}\gamma} < 200$
 - ◆ This can reduce $\mu\mu\gamma$ BG, but has bias in $h \rightarrow \tau\tau$ mode
- Type “乙”
 - ◆ Using cut is same as “甲”, but consider the photon selection
 - $M_{2\gamma} < 0.01, 0.2 < M_{2\gamma}$
 - ◆ This can repress bias, but $\mu\mu\gamma$ eff. will be worse.
- Type “丙”
 - ◆ Using cut is same as “甲”, and consider the limited photon selection
 - $M_{2\gamma} < 0.01, 0.2 < M_{2\gamma}$
 - $E_{\gamma} > 60$
 - ◆ This type is compatible with both reducing bias and $\mu\mu\gamma$ BG

Comparing results

$$PT_{bal} < -10, 10 < \delta PT_{bal}$$

$$M_{ll\gamma} < 200$$

	efficiency of δPT_{bal} cut				Results after all cut		
	bb	$\tau\tau$	cc	z_l (BG)	purity	δ_σ	δ_m
甲型	99.4%	95.3%	99.0%	14.5%	24.8%	3.72%	37.1MeV
乙型	99.8%	98.0%	99.6%	62.8%	20.3%	3.93%	39.1MeV
丙型	99.8%	97.8%	99.6%	22.2%	23.9%	3.74%	37.0MeV

- Type “丙” seems to be better to use.
- If I set δPT_{bal} cut looser (such as (-5, 5) is restricted), $h \rightarrow \tau\tau$ bias can be smaller ($\sim 1\%$), but cut eff. will be worse so that stat. error will increase.