

Parton Shower uncertainty---single higgs

- Pythia8 single higgs samples: h027 pythia, path: /eos/atlas/atlascerngroupdisk/phys-higgs/HSG1/MxAOD/h027/mc16*/Nominal
- Herwig7 single higgs samples: h027 herwig, path: /eos/atlas/atlascerngroupdisk/phys-higgs/HSG1/MxAOD/h027/mc16*/Nominal
- Evaluation of the theoretical systematics uncertainties on the efficiency:

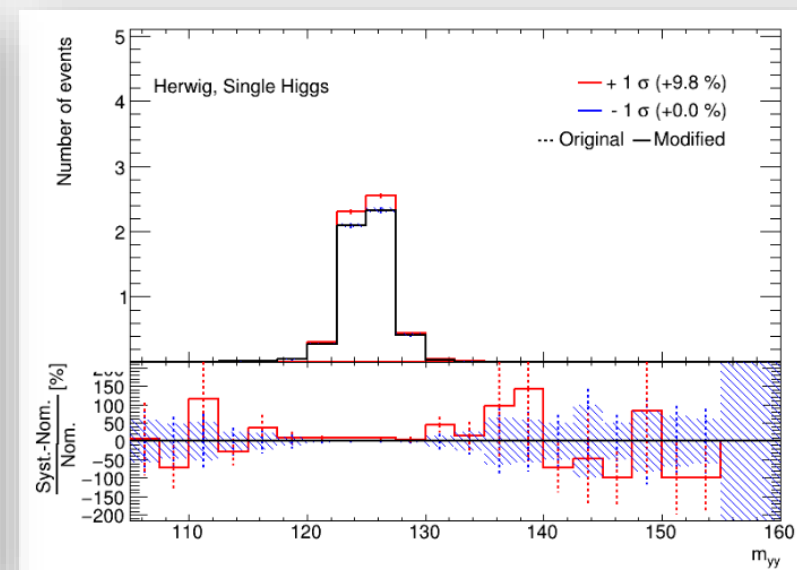
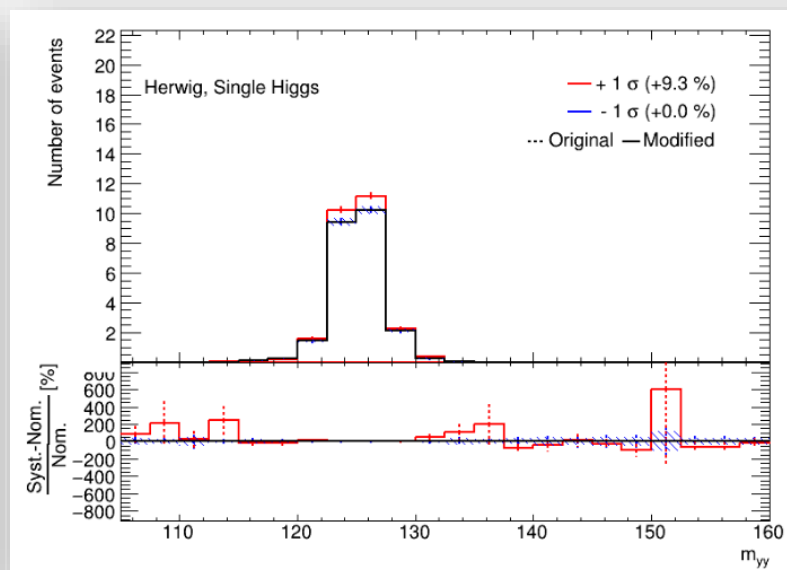
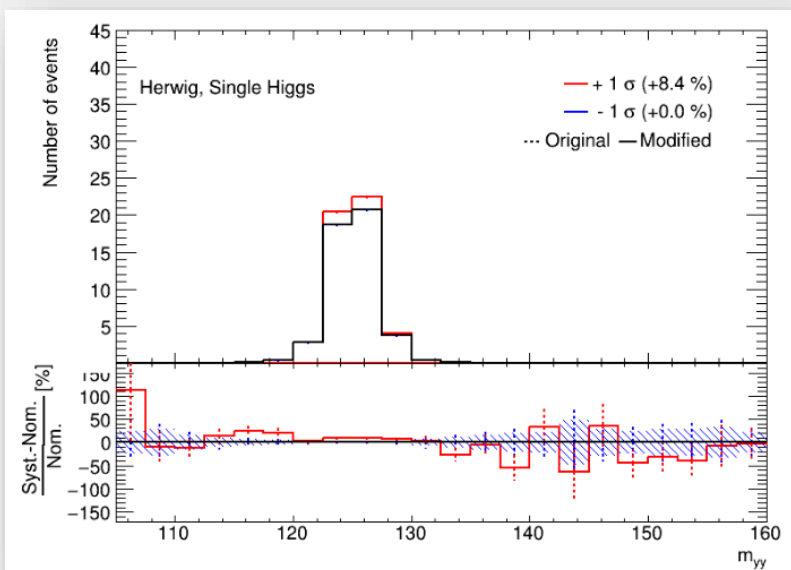
$$\varepsilon_{\text{syst}} = \frac{\varepsilon_{\text{variated}}}{\varepsilon_{\text{nominal}}} - 1$$

$$\text{Where } \varepsilon_{\text{variated}} = \frac{\text{SumWeights}_{\text{Aftercuts}}^{\text{herwig}}}{\text{SumWeights}_{\text{Beforecuts}}^{\text{herwig}}}, \varepsilon_{\text{nominal}} = \frac{\text{SumWeights}_{\text{Aftercuts}}^{\text{pythia}}}{\text{SumWeights}_{\text{Beforecuts}}^{\text{pythia}}}$$

Aftercuts means pass select cut (select different channels).

Beforecuts means only use the basic cut in HgamCore. (MxAOD selection, exactly 2 photons)

Parton Shower uncertainty



	$\sigma_{parton\ shower}$
$1l + jets$	8.45%
$1\tau_{had} + jets$	9.34%
$2(l + \tau_{had})$	9.78%