

Heavy Higgs mass reweighting.

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Motivation

G. Passarino proposed the so-called **propagator scheme** which should be implemented for high mass Higgs.

Ideally this will be implemented within Monte-Carlo. For the time being it was proposed to **reweight** existing Powheg samples.

Weights calculated available for both ggF and VBF processes.

ggF

Weights calculated as:

$$\text{factor} = (\text{Passarino distributions}) / \text{POWHEG}(\text{POWHEG propagator})$$

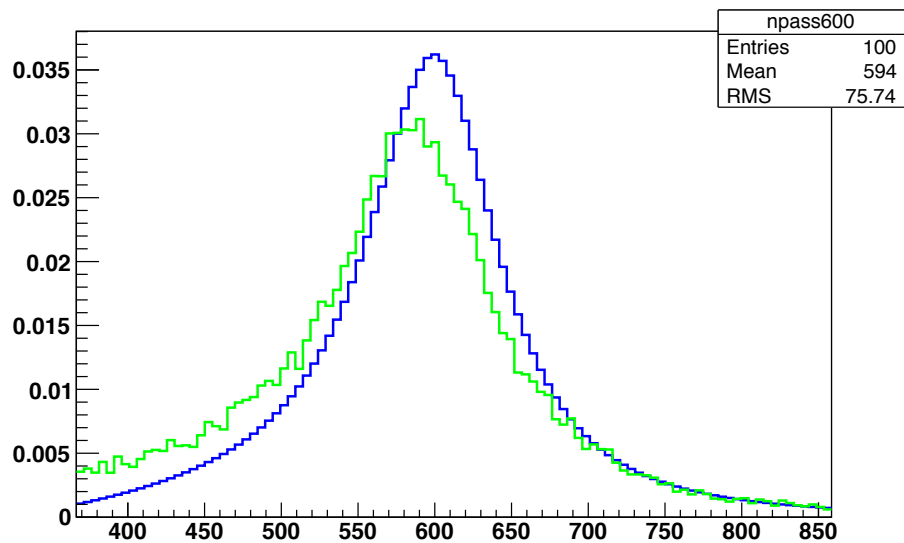
VBF

Weights calculated as:

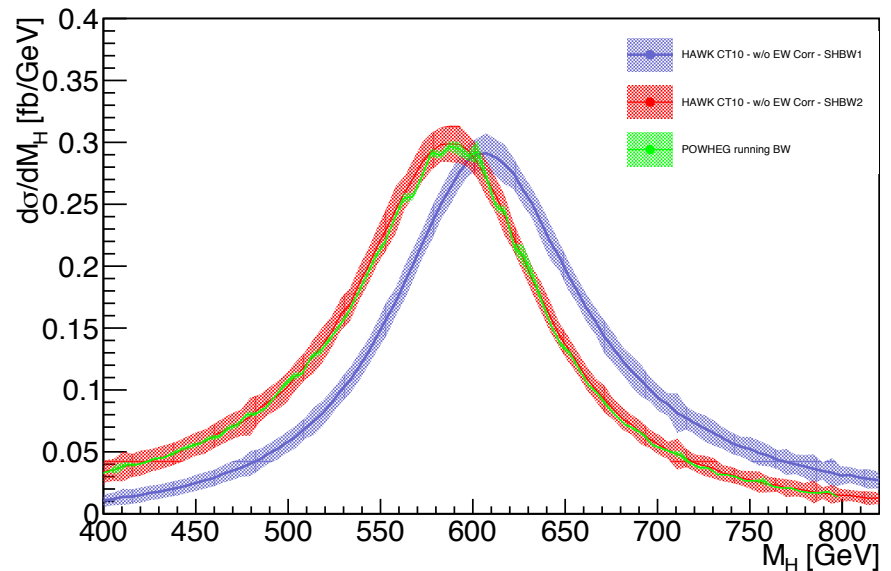
$$\text{factor} = \text{HAWK}(\text{Passarino-propagator, EW corr}) / \text{HAWK}(\text{POWHEG propagator, no EW corr})$$

Procedure I

ggF



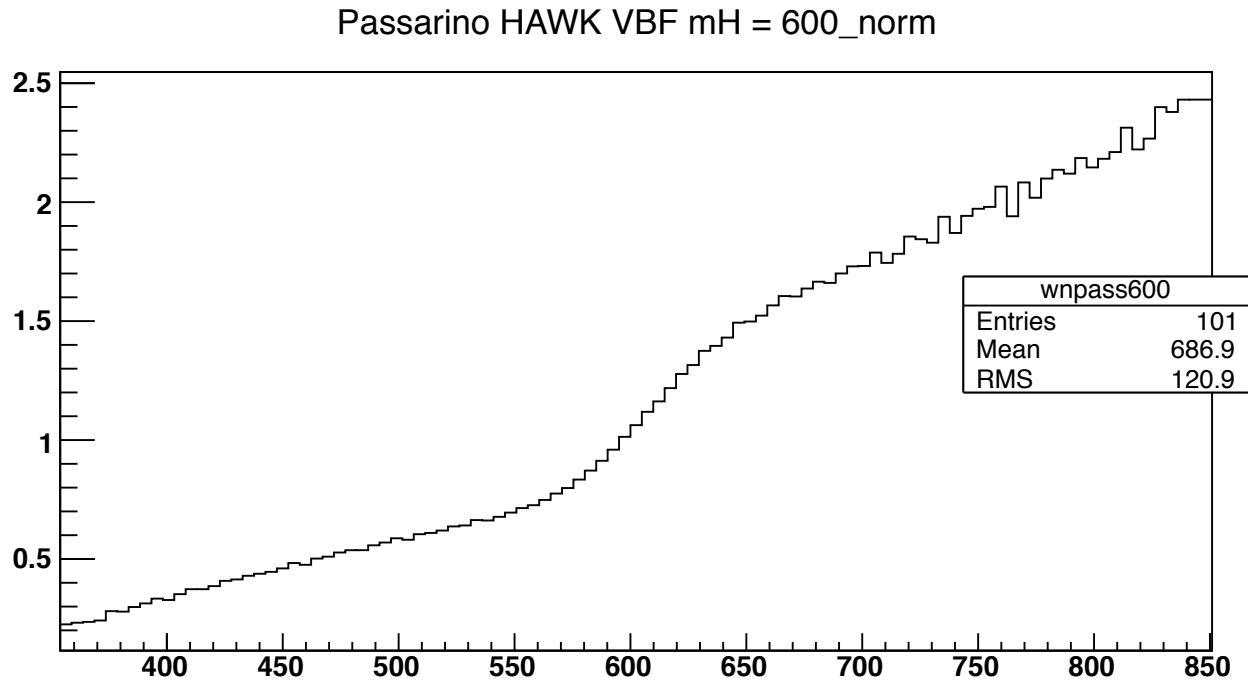
VBF



600 GeV comparison plots. Existing powheg shown in green, lineshape a la Passarino prescription in shown in blue.

Procedure II

Reweighting is for m_H distribution only.
Scaling factor taken from ratio plot.



How to use

Load package:

```
gROOT->ProcessLine (".L mHreweighting.cxx");
```

Set up reweighting conditions:

```
mHreweighting reweight(Higgs_signal_mass, "./", prod_method);
```

Higgs_signal_mass = 400,420,440,...,600,650,700,...,850

prod_method = VBF or ggF.

Call reweight for found m_H (m_{higgs}):

```
factor_to_scale_by = reweight.getweight(m_higgs);
```

Package which contains the reweighting code and weight files also contains an example file.

Repositories and References.

Code available here:

https://svnweb.cern.ch/cern/wsvn/atlasusr/gsteele/Heavy_Higgs_Reweighting/trunk/

Twiki here:

https://twiki.cern.ch/twiki/bin/viewauth/AtlasProtected/HiggsCrossSection#3_Heavy_Higgs_Lineshape_and_VV_s

Passarino's Paper here:

<http://arxiv.org/abs/1112.5517>