



Measurements of Differential Higgs Boson Production Cross Sections in the Leptonic WW Decay Mode with CMS

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Introduction



- What was studied?:
 - Higgs, decaying to two W bosons, in different flavor leptonic channel ($e^{\pm}\mu^{\mp}\nu\bar{\nu}$ final state)
 - Differential cross section measurement with respect to:
 - Transverse momentum of Higgs (p_T^H)
 - Jet multiplicity (*N_{jet}*)
- Motivation:
 - Higgs decay to WW has a large branching fraction, making it ideal for:
 - Precision measurement of the cross section
 - Measurements with subleading production modes
 - Different flavor leptonic channel is cleanest
 - The final state does not require Higgs to be boosted, thus allowing use of full range of p_T^H



Method



- Number of signal events from each generator level bin extracted from a fit of 2D (m^{ll}, m_T^H) distributions
 - m^{ll} and m_T^H discriminate well against background processes
- The fit includes the unfolding, regularization and signal extraction, which are all done simultaneously
 - Regularization not needed for N_{jet} part of analysis
- Cross sections are determined from the fit to all bins and categories of both the signal and two control regions
 - This gives the signal strength modifiers, which in this case are taken to be equivalent to the scale factors from the fit
 - Control regions for $t\bar{t}$ pair production and Drell-Yan τ pair production

 $\mu_i (signal strength modifiers) = \frac{\sigma_i^{obs}}{\sigma_i^{SM}}$



Leading uncertainties: Non-prompt background, WW background, Residual p_T^{miss} uncertainties, Lepton ID efficiency scale factors