



Off-shell Higgs for LHC Run 2

Yanyan Gao (University of Edinburgh)

Jian Wang (Universite Libre de Bruxelles)

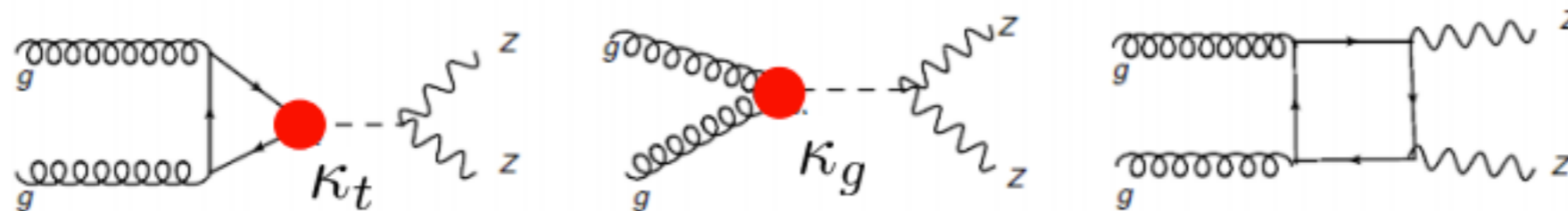
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To sharpen the Higgs width constraints

- Continue the Higgs width constraints in Run 2
 - H->4l channel is statistical limited
- Constraints on the Higgs width **with VBF only**
 - **No loop contribution - model independent (?)**
 - 20/fb @ 8TeV, VBF ZZ->2l2nu channel sets a limit of $\sim 40 \times \text{SM Higgs width}$ (**CMS-PAS-HIG-14-002**); VBF WW could be competitive here
 - Better S/B; much larger statistics in Run 2
 - Could combine all ZZ,WW channels
 - Theoretical uncertainties better understood (e.g. background K factor); but still ggH contamination

Higgs couplings study using off-shell signal strength

- Mid-term wish list
 - [K factor of \$gg \rightarrow VV\$](#) background and consequently interference (Currently using signal K factor with conservative uncertainty)
 - Reliable description of [jet multiplicity/pT\(VV\)](#)
- New ideas popping up
 - e.g. **1406.6338**, to constrain top Yukawa couplings
 - Will need MC to implement the models



$$\mathcal{M}_{gg \rightarrow ZZ} = \kappa_t \mathcal{M}_{\kappa_t} + \kappa_g \mathcal{M}_{\kappa_g} + \mathcal{M}_{\text{background}}$$