

# **Higgs Coupling Modifier Fits**

---

**Markus Klute**

**Snowmass 2013**

**Energy Frontier Parallel Meeting**

**Higgs Couplings**

**July 31st, 2013**

# Higgs Boson Coupling Modifier Fits

Observable parameter (9 parameter fit)

$\kappa_g, \kappa_\gamma, \kappa_{Z\gamma}$ : loop diagrams

$\kappa_W, \kappa_Z$ : vector bosons

$\kappa_t, \kappa_b$ : up- and down-type quarks

$\kappa_\tau, \kappa_\mu$ : charged leptons

Unobservable parameter

$\kappa_c = \kappa_t$

$\kappa_s = \kappa_b$

$\kappa_\mu = \kappa_\tau$

from sum of partial widths, no BSM

$$\kappa_H^2(\kappa_i, m_H) = \sum_{j = WW^{(*)}, ZZ^{(*)}, b\bar{b}, \tau^-\tau^+, \gamma\gamma, Z\gamma, gg, t\bar{t}, c\bar{c}, s\bar{s}, \mu^-\mu^+} \frac{\Gamma_j(\kappa_i, m_H)}{\Gamma_H^{\text{SM}}(m_H)}$$

Alternative fit for  $\text{BR}_{\text{BSM}}$

$$\Gamma_{\text{tot}} = \sum \Gamma_{ii} + \Gamma_{\text{BSM}}$$

$$\text{BR}_{\text{BSM}} = \Gamma_{\text{BSM}} / \Gamma_{\text{tot}}$$

assumption here  $\kappa_W, \kappa_Z < 1$

some details in arXiv: 1209.0040

L (fb <sup>-1</sup> )	$\kappa_\gamma$	$\kappa_W$	$\kappa_Z$	$\kappa_g$	$\kappa_b$	$\kappa_t$	$\kappa_\tau$	$\kappa_{Z\gamma}$	$\text{BR}_{\text{inv}}$
300	[5, 7]	[4, 6]	[4, 6]	[6, 8]	[10, 13]	[14, 15]	[6, 8]	[41, 41]	[14, 18]
3000	[2, 5]	[2, 5]	[2, 4]	[3, 5]	[4, 7]	[7, 10]	[2, 5]	[10, 12]	[7, 11]

# Inputs

---

	untagged	jet-tag	VBF	VH	ttH
$H \rightarrow \gamma\gamma$	used				
$H \rightarrow WW \rightarrow 2l2\nu$					1307.7280
$H \rightarrow ZZ \rightarrow 4l$		possible			
$H \rightarrow bb$					
$H \rightarrow \tau\tau$					
$H \rightarrow Z\gamma$					
$H \rightarrow \mu\mu$					
$H \rightarrow \text{invisible}$					
$H \rightarrow HH$					