University of Zurich [UZH]

Measurements of ttH production at CMS

Sergio Sánchez Cruz (on behalf of the CMS Collaboration)

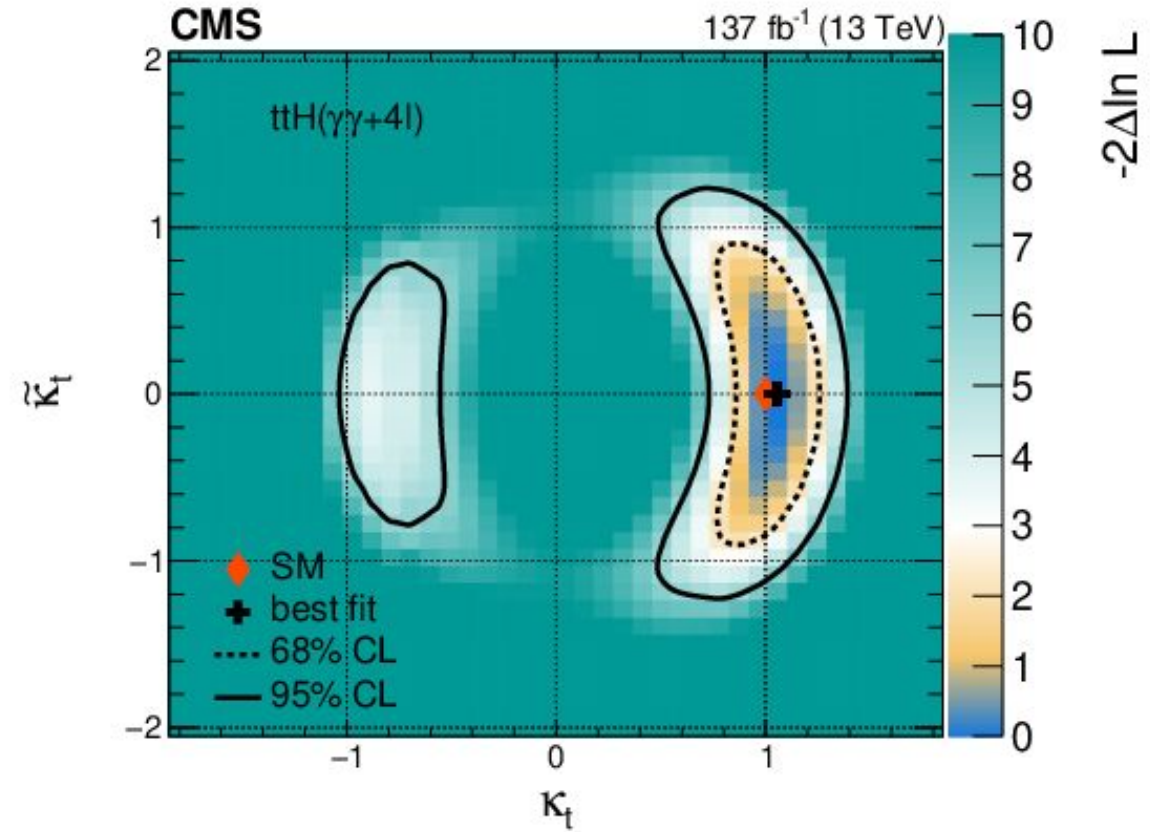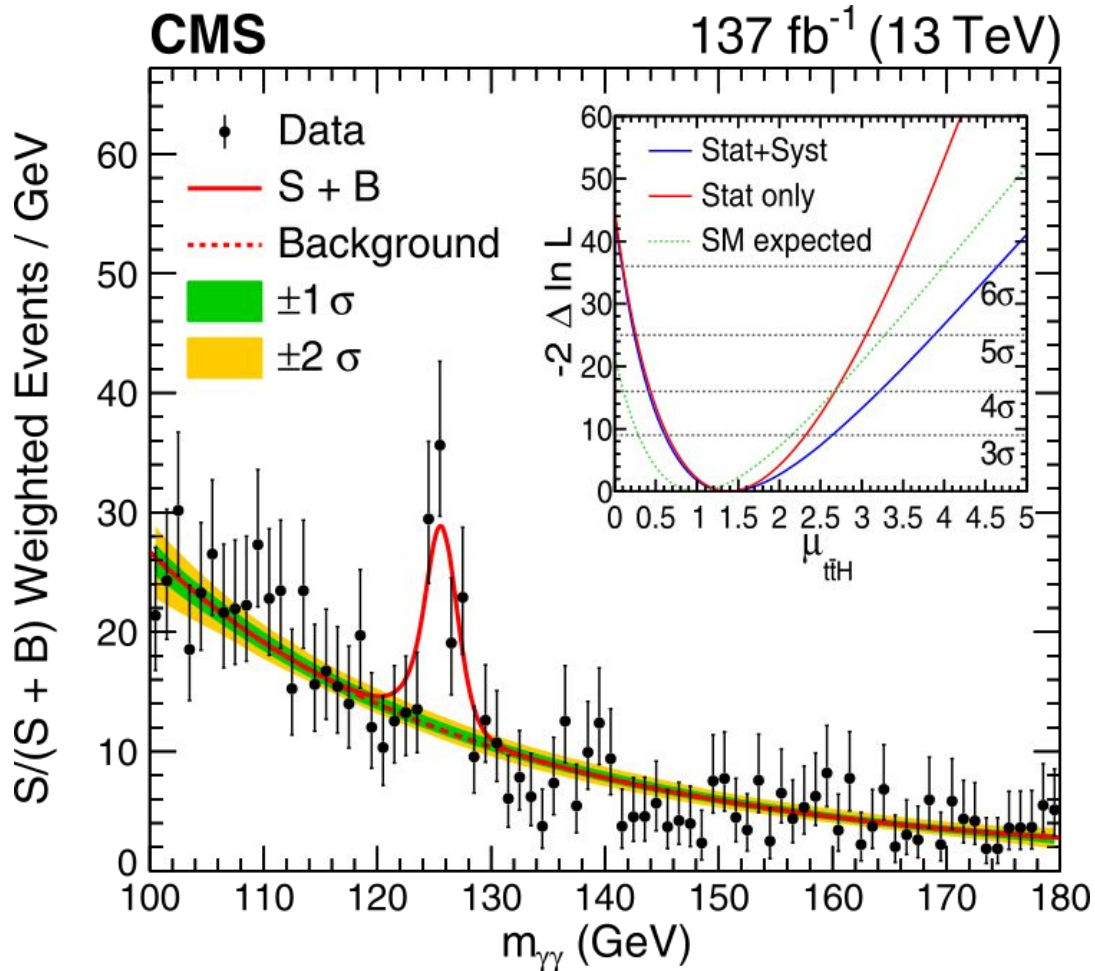**Higgs 2021**, October 18-22 2021, Stony Brook University
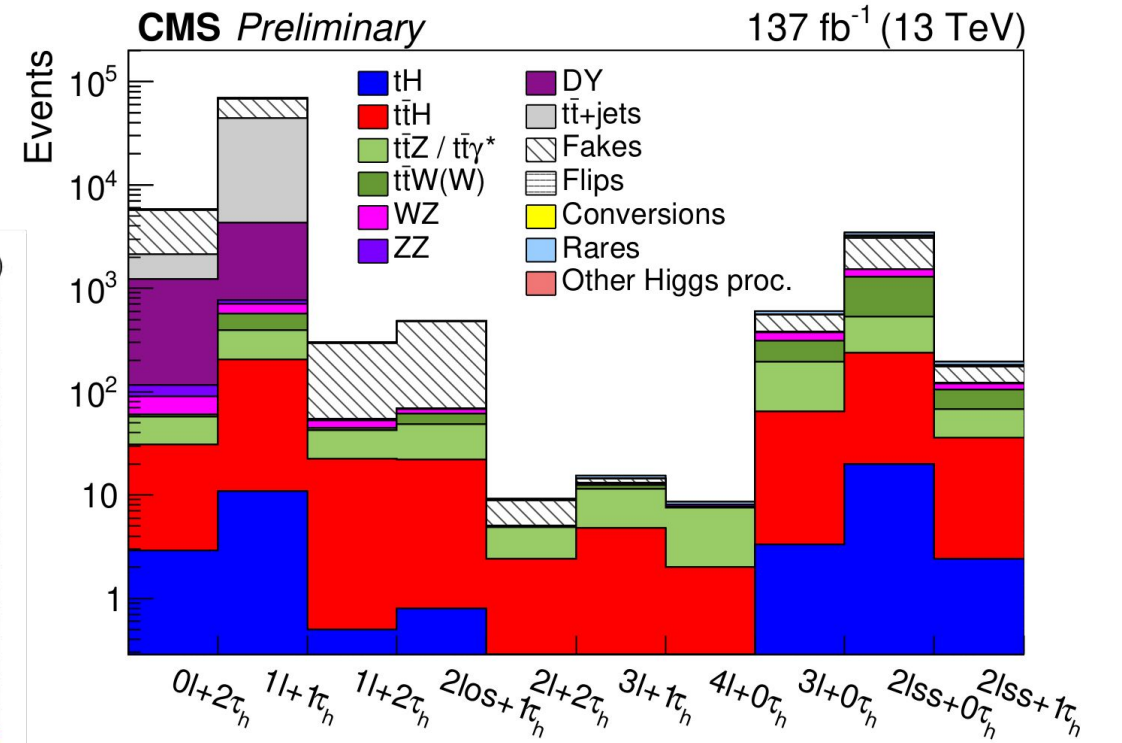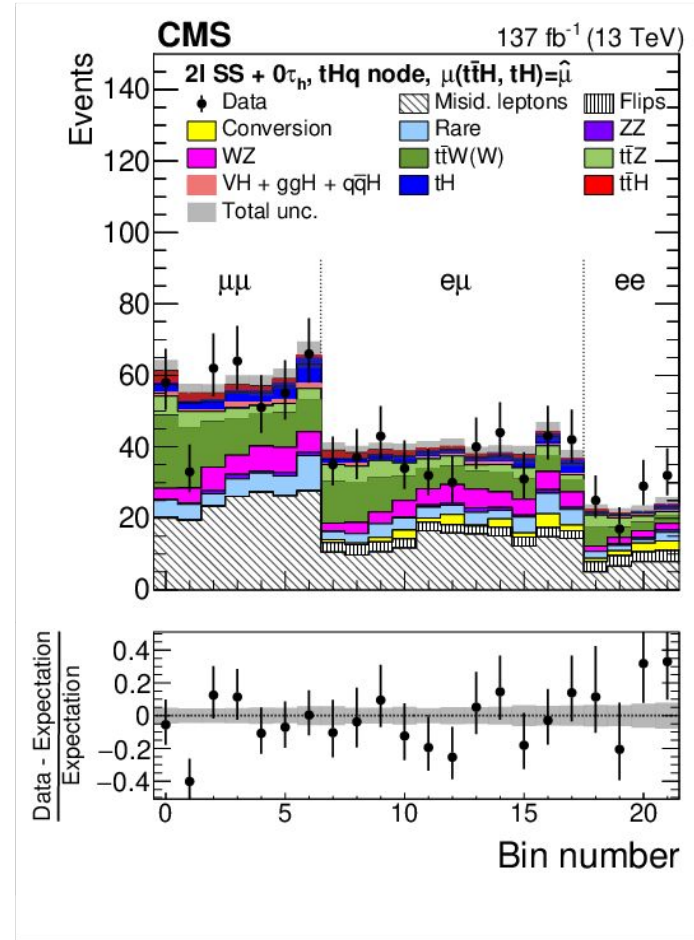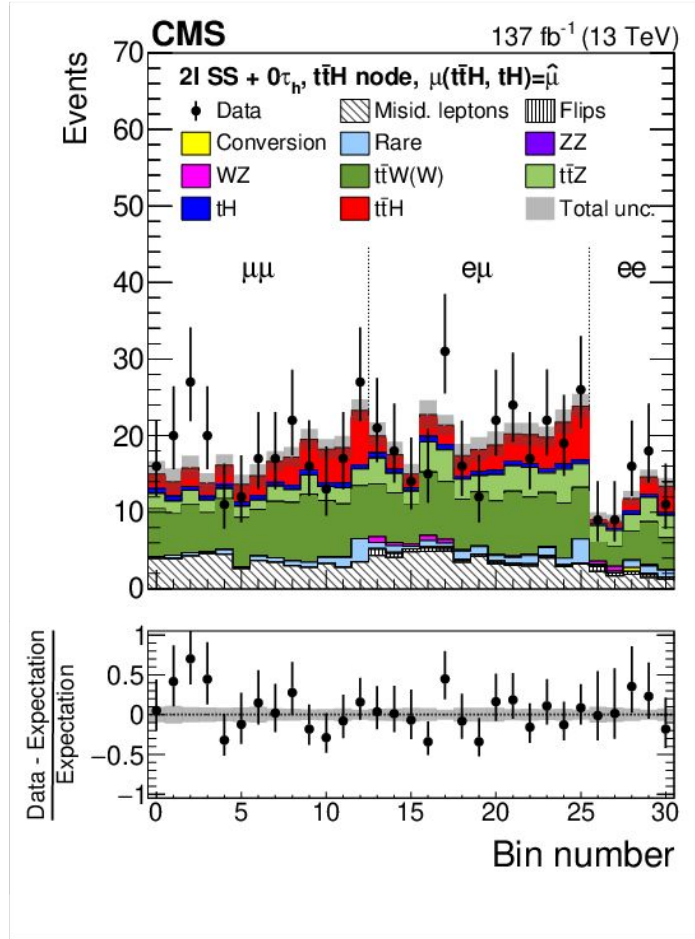
tt(H→γγ) analysis

- Categorization based on event kinematics
  - Signal vs background
  - CP even vs CP odd signal
- Signal obtained by fitting $m_{\gamma\gamma}$ in all the categories

- Observed ttH signal strength $\mu_{ttH}=1.38^{+0.36}_{-0.29}$
- Expected (observed) significance: 6.6σ (4.7σ) → **observation of ttH production in this channel**

$$\mathcal{A}(Htt) = -\frac{m_t}{v}\bar{\psi}_t(\kappa_t + i\tilde{\kappa}_t\gamma_5)\psi$$

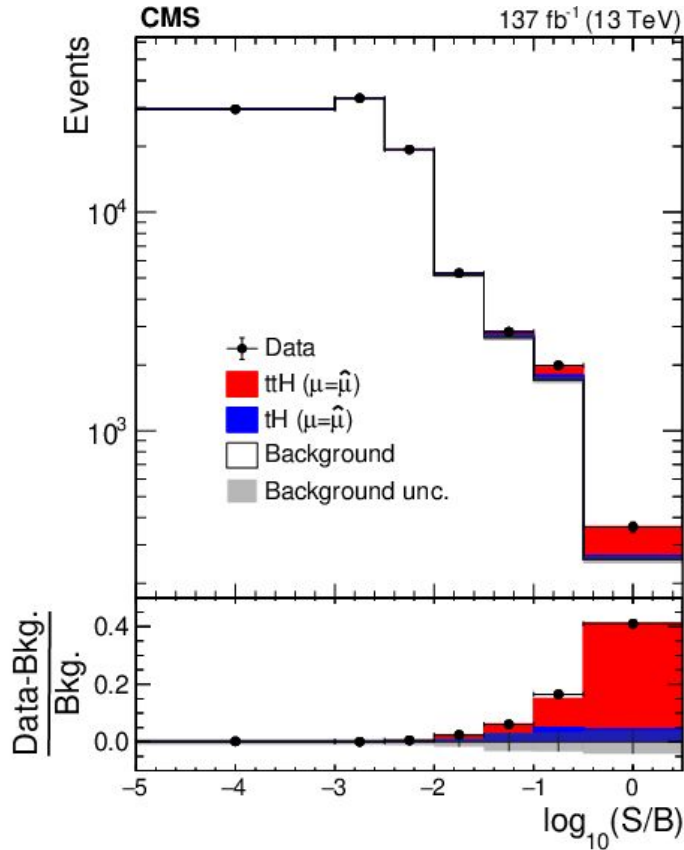# ttH multilepton (ttH→ WW*, ττ)

- **Measuring both ttH and tH**
- **10 disjoint regions** based on lepton and τ_h multiplicity
- Selection still **dominated by backgrounds**
- Using MVA methods to classify signal and background

Results

- Signal extracted by fitting data in all distributions
- Significance of ttH production: obs 4.7 (exp 5.2) s.d.
- Significance of tH production: obs 1.4 (exp 0.3) s.d.
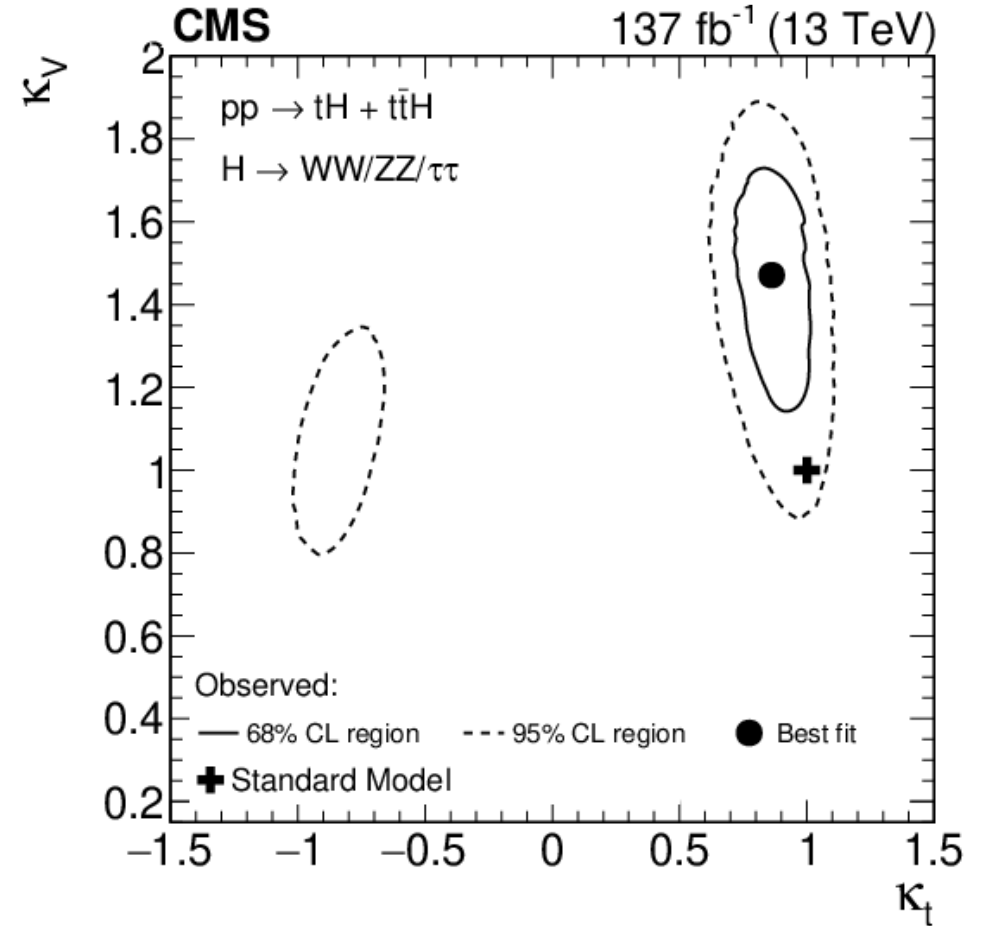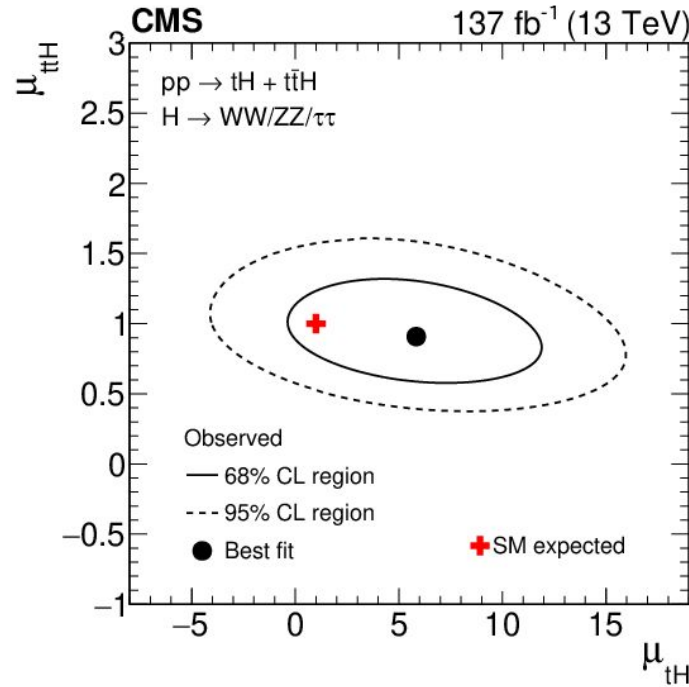
- Limits on Higgs coupling modifiers

Conclusions

- ttH and tH are very important processes to have an understanding of the top-Higgs interactions
- Diphoton and multilepton final states provide 5σ-level sensitivity
- Allow to probe different BSM scenarios

- All results so far consistent with the SM Higgs!
- Keep posted for more upcoming results:
  - other final states
  - new searches for BSM effects