**Introduction**

- Due to large mass of top quark, top-Yukawa coupling is nearly unitary and paramount to an understanding of EWSB
  - tH production offers a unique opportunity for direct measurement of the coupling and could provide hints to new physics
  - Several Higgs decay channels with very different strategies and advantages

**Diphoton Channel**

This channel capitalizes on the fine resolution of the diphoton mass to enhance sensitivity and is also inclusive of tH production.

**Bottom Channel**

This channel allows for a measurement of the Higgs coupling to both 3rd generation quarks and benefits from the large H-bb branching ratio.

**Multilepton Channel**

This channel is sensitive to the Higgs coupling to the 3rd generation charged lepton as well as the off-shell couplings of H+WW* and H+ZZ*.

**Analysis Strategy**

- Modelled by simple exponential
- Fit for each category to the data sidestrips using 7+1 TeV data
- Validated in data control region with loosened isolation + ID
- Shape parameters are parameterized as a function of m_jets of which n_jets are b-tagged (≥4j, ≥4j, 2b)
- Signal regions are selected such that S/B > 1% and S/B > 0.3

**Systematic Uncertainties**

- **Diphoton Channel**
  - Background Modeling: Large uncertainty on the underlying event
  - Signal Modeling: Shaped parameters are parameterized as a function of m_jets of which n_jets are b-tagged (≥4j, ≥4j, 2b)
  - Signal shape assumed to be same among different Higgs productions

**Results**

- Consistent with the SM, no significant excess is observed
  - 95% CL limits on σ_{H diphot} & σ_{H+bb}

**Combination & Future**

- Using the full Run 1 dataset, no significant excess is observed. A 95% CL limit and measurement of the signal strength is included into the ATLAS Higgs combination. Observation is expected to be possible within Run 2.


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**arXiv:1506.05988 [hep-ex] [multileptons]**

**arXiv:1507.04548 [hep-ex] [combination]**

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