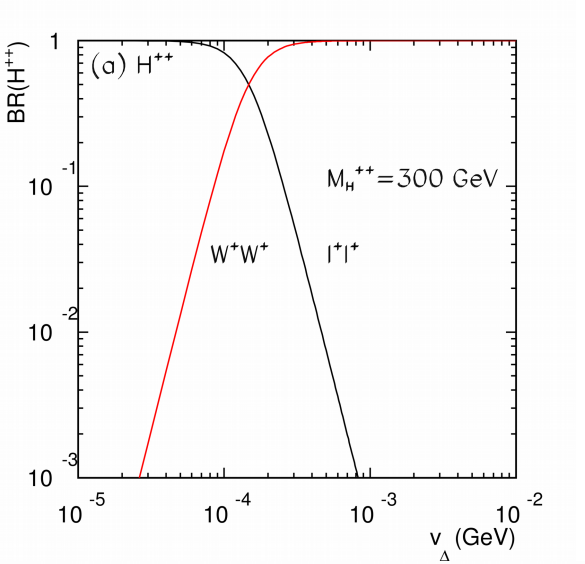
Summary of DTHM analysis

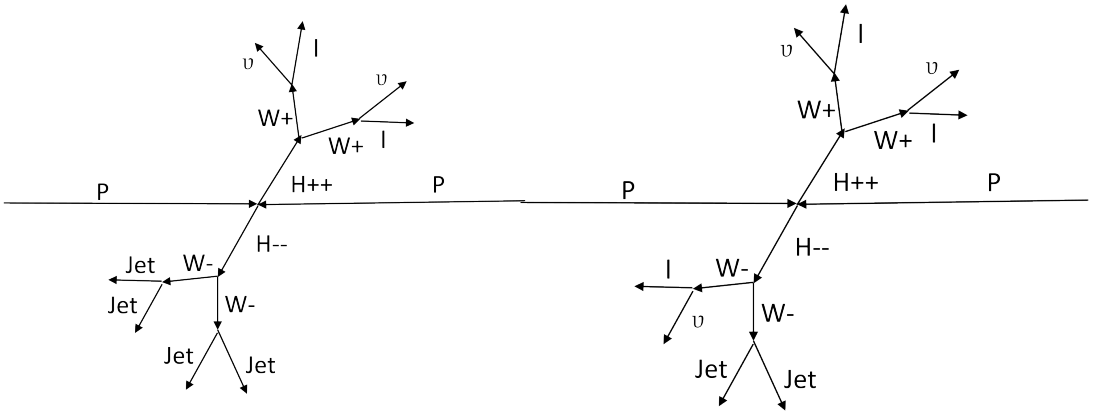
Motivation and final states for H^{++} search

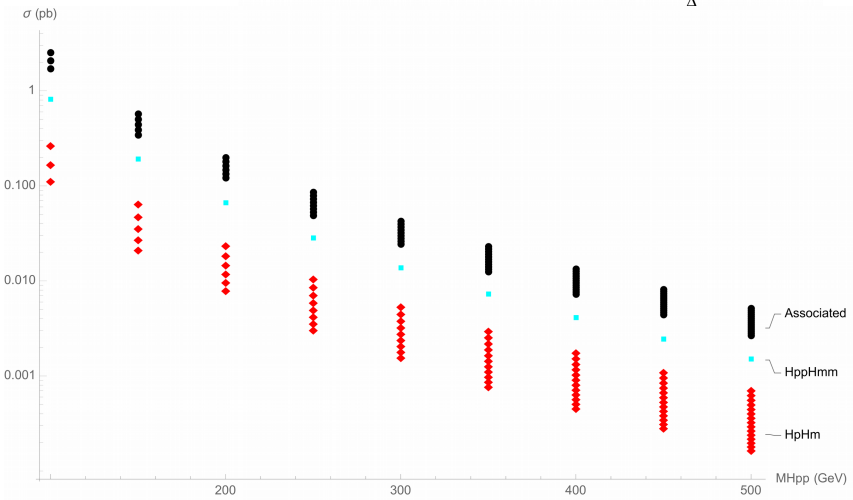
- Introducing a Y = 2 scalar triplet allows massive neutrinos in the standard model.
  - Rich scalar structure; includes a H^{++}
- Explore parameter space where WW decay mode dominates.
- Pair-production of doubly charged Higgses and WW decay mode gives several final states.
  - Focus on 2 and 3 lepton final states.



$$H^{\pm\pm}H^{\mp\mp} \rightarrow 4W \rightarrow 3\ell + E_T^{miss} + 2j$$

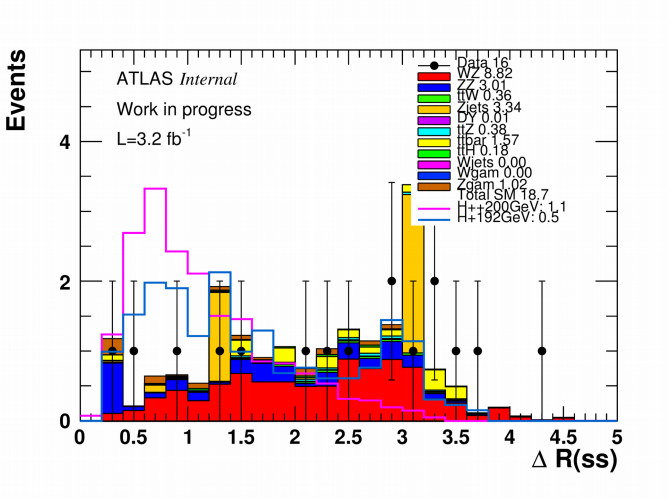
$$H^{\pm\pm}H^{\mp\mp} \rightarrow 4W \rightarrow 2\ell^{ss} + E_T^{miss} + 4j$$

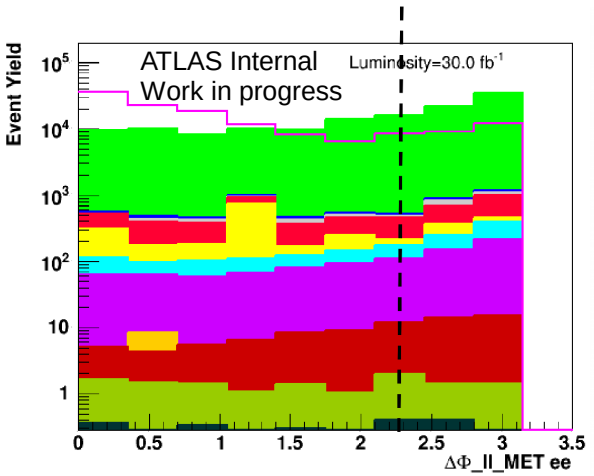


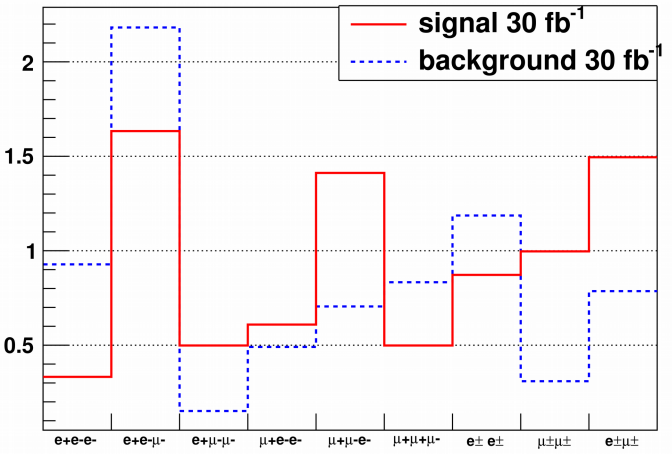


Cross-sections as a function of mH^{++}: Pair-produciton of H^{++}, H^{+}, and associated production of H^{++} and H^{+}

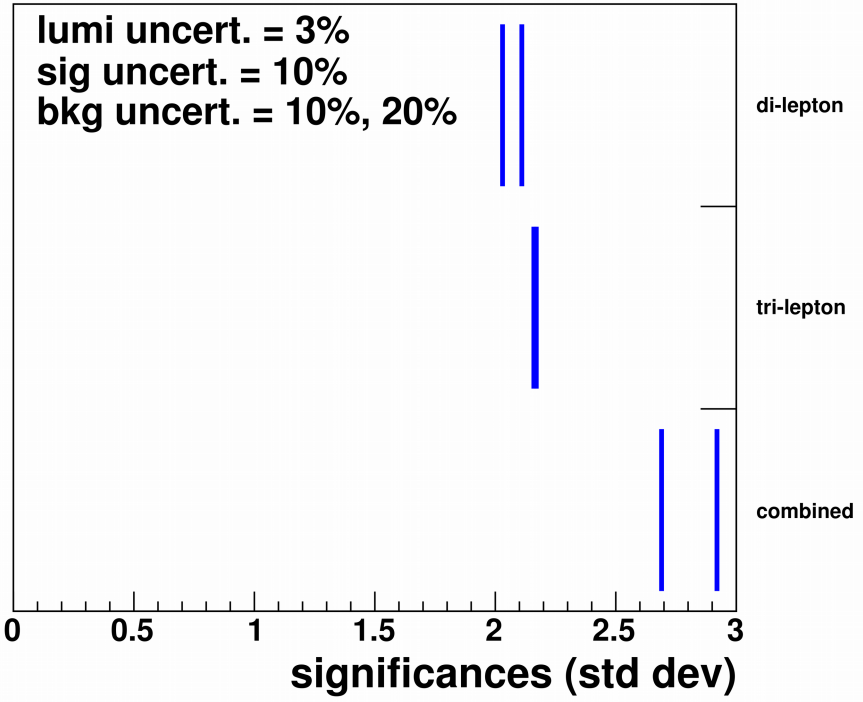
Sensitivity







- The above plots show some of the discriminating variables in the two channels.
  - Significant separation between signal and background.
  - Cuts are optimized on such variables for both channels.
- Top right plot shows signal and background yields in different flavour dependent channels.
- Combined sensitivity of both channels **at 30 fb^{-1} is 2.9σ** for benchmark mass point of 200 GeV.



Doublet-Triplet Extension of the SM

- Introduce a Y = 2 to obtain massive neutrinos
  - Rich scalar structure with a doubly charged Higgs
  - Can be investigated at the LHC
- Phenomenology
  - Implementation of the model in CalcHEP
  - Scan of parameter space
  - Generation of events

$$H^{\pm\pm}H^{\mp\mp} \to 4W \to 3\ell + E_T^{miss} + 2j$$
$$H^{\pm\pm}H^{\mp\mp} \to 4W \to 2\ell^{ss} + E_T^{miss} + 4j$$

- Experimental
  - Simulation of the ATLAS detector
  - Model sensitivity and prospect study for Run-2 at the LHC.
    - Request to begin analysis approved by ATLAS.
  - Analysis on-going: Search for H^{++} with several benchmark points selected using a slice of the parameter space.
- Targets:
  - Paper with detailed phenomenology studies
  - Paper describing the experimental analysis