

Search for Dark Matter produced in association with a Higgs boson decaying to $b\bar{b}$ using 36 fb^{-1} of pp collisions at $\sqrt{s} = 13 \text{ TeV}$ with the ATLAS detector



Introduction

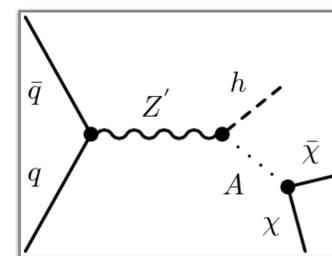
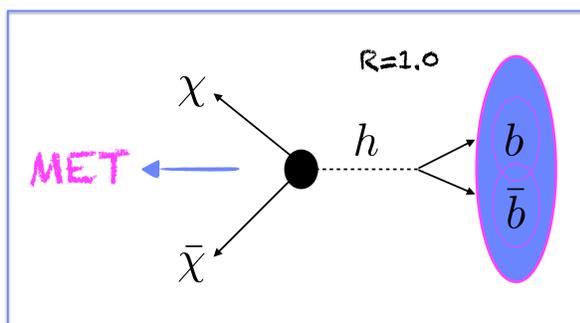
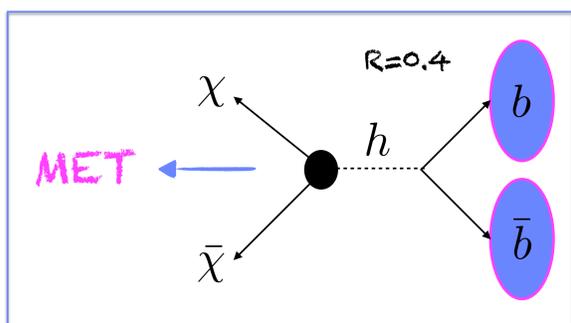
Search for events with large missing transverse momentum (MET) recoiling against a Standard Model (SM) particle is a probe for detecting Dark Matter (DM) at the LHC. The discovery of the Higgs boson h opens a new opportunity through the h +MET signature, with the $h \rightarrow b\bar{b}$ being the most probable decay channel. The results are interpreted in the context of a simplified model Z' -2HDM and also less model-dependent limits on the visible cross section are provided for $h \rightarrow b\bar{b}$ +DM beyond SM processes.

Analysis Strategy

Depending on the transverse momentum of the Higgs boson (and hence MET), the Higgs candidate is reconstructed as a system of two b-tagged small radius jets or as a single large radius jet containing two b-tagged subjets.

Resolved:
MET $\leq 500 \text{ GeV}$

Merged:
MET $> 500 \text{ GeV}$



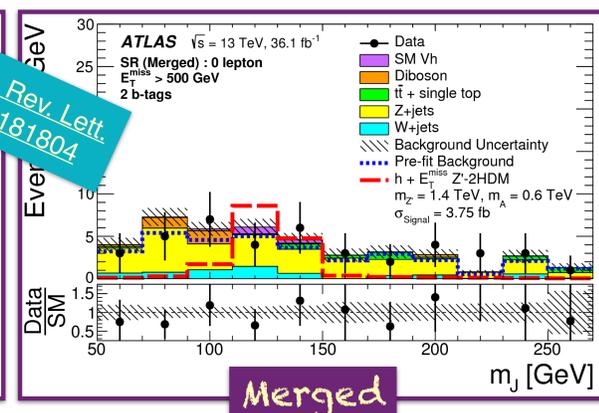
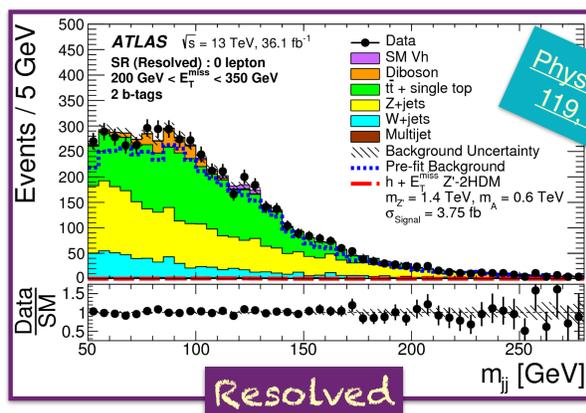
A Type-II two-Higgs-doublet model (2HDM), where the h +DM signal is produced through a Z' mediator coupling to h and to the pseudo-scalar A , is used as a benchmark signal model.

Event selection and background estimation

The events are divided in different categories depending on the lepton multiplicity:

- 0-lepton Signal Region
- 1-lepton Control Region: estimation of W +jets and $t\bar{t}$ background
- 2-lepton Control Region: estimation of Z +jets background

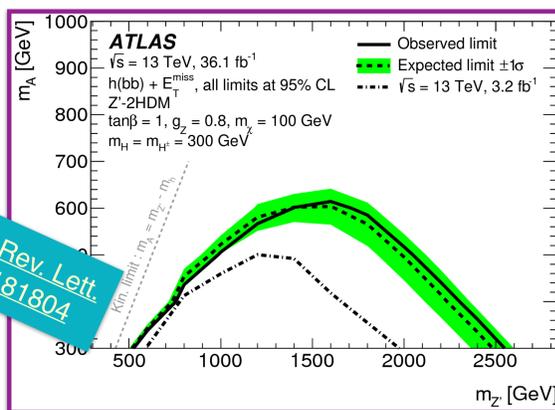
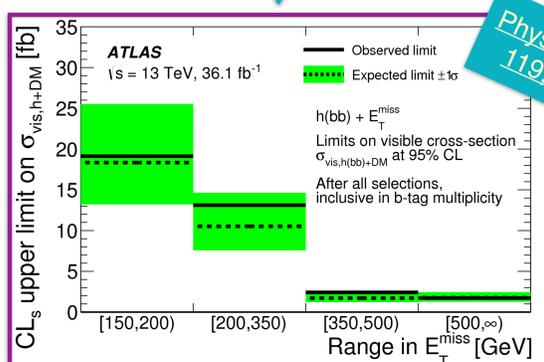
x 4 MET bins
x 1,2 b-tag



No excess observed over the Standard Model prediction.

Interpretation of the results

Less model-dependent limits on visible production cross-section of h +DM events



Z' -2HDM exclusion limits

Expected sensitivity gain at high $m_{Z'}$ from b-tagging on Variable-Radius track jets.

