



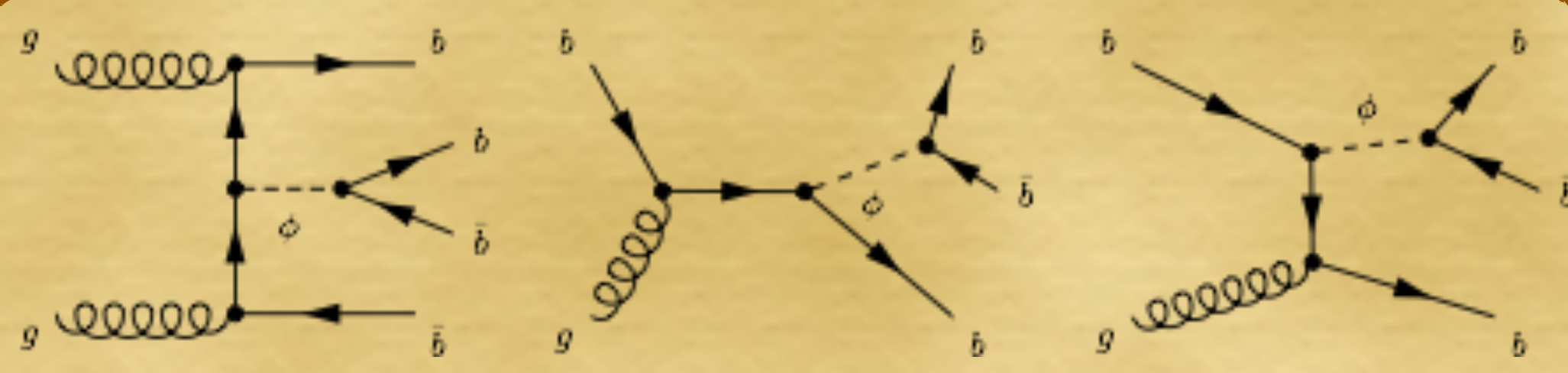
HI GUYS ! I AM "125 GEV HIGGS BOSON".
DO YOU KNOW IF I HAVE SIBLINGS AND HOW TO FIND THEM?

OF COURSE ! I CAN TELL YOU HOW
JUST FOLLOW THIS ROUTE, MY FRIENDS WILL EXPLAIN
AND YOU WILL FIND OUT, LET'S GO !



SEARCH FOR BEYOND THE STANDARD MODEL HIGGS BOSONS DECAYING INTO A BOTTOM QUARK-ANTIQUARK PAIR AT CMS

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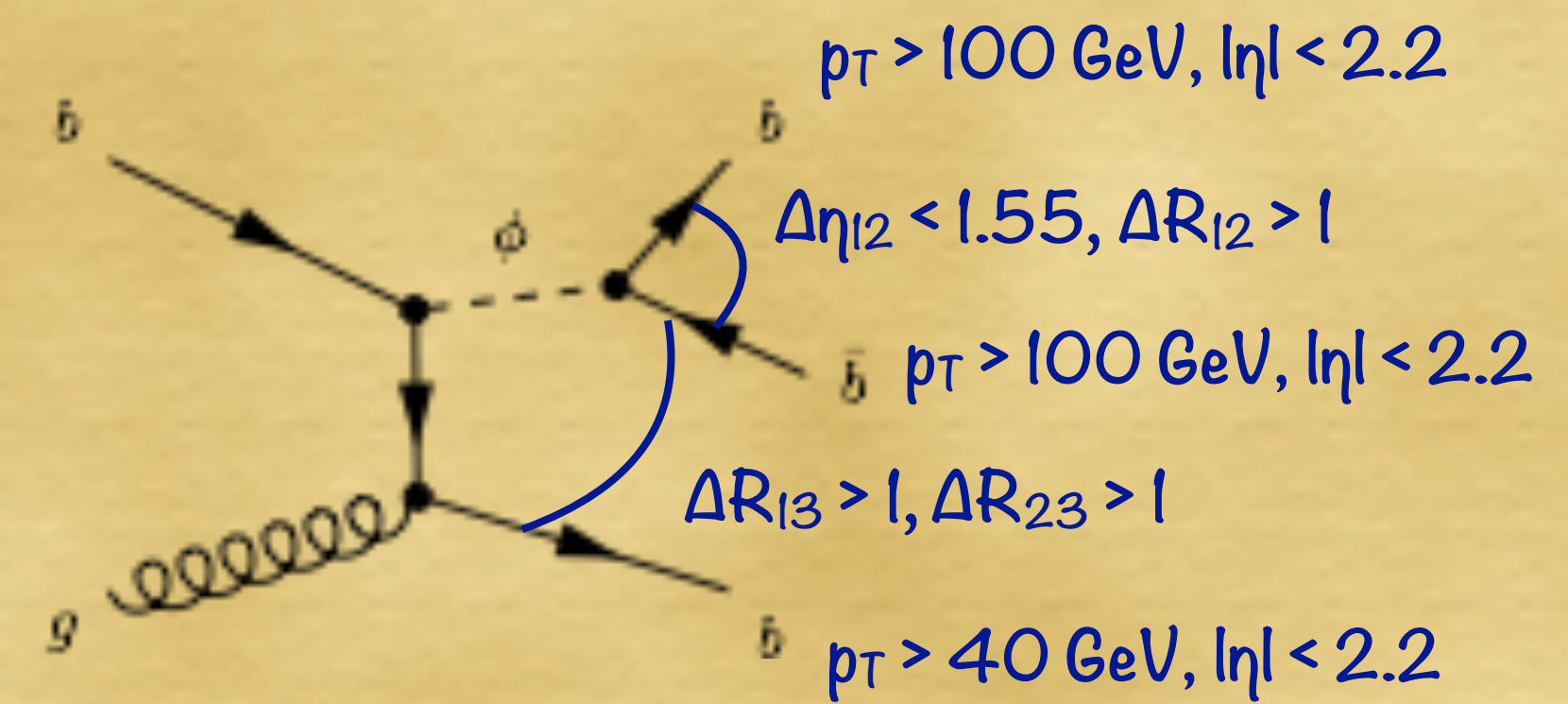


Feynman diagrams of signal processes

- ★ A/H boson decaying to a $b\bar{b}$ pair is dominant channel
- ★ b-associated production $\rightarrow$ cross section enhanced up to $\sim 2 \tan^2 \beta$ in MSSM and 2HDM
- ★ Main challenge from large QCD multijet background

Event selection

- ★ Dedicated triggers requiring two online b-tagged jets
- ★ Offline selection asks at least 3 leading jets to be b-tagged



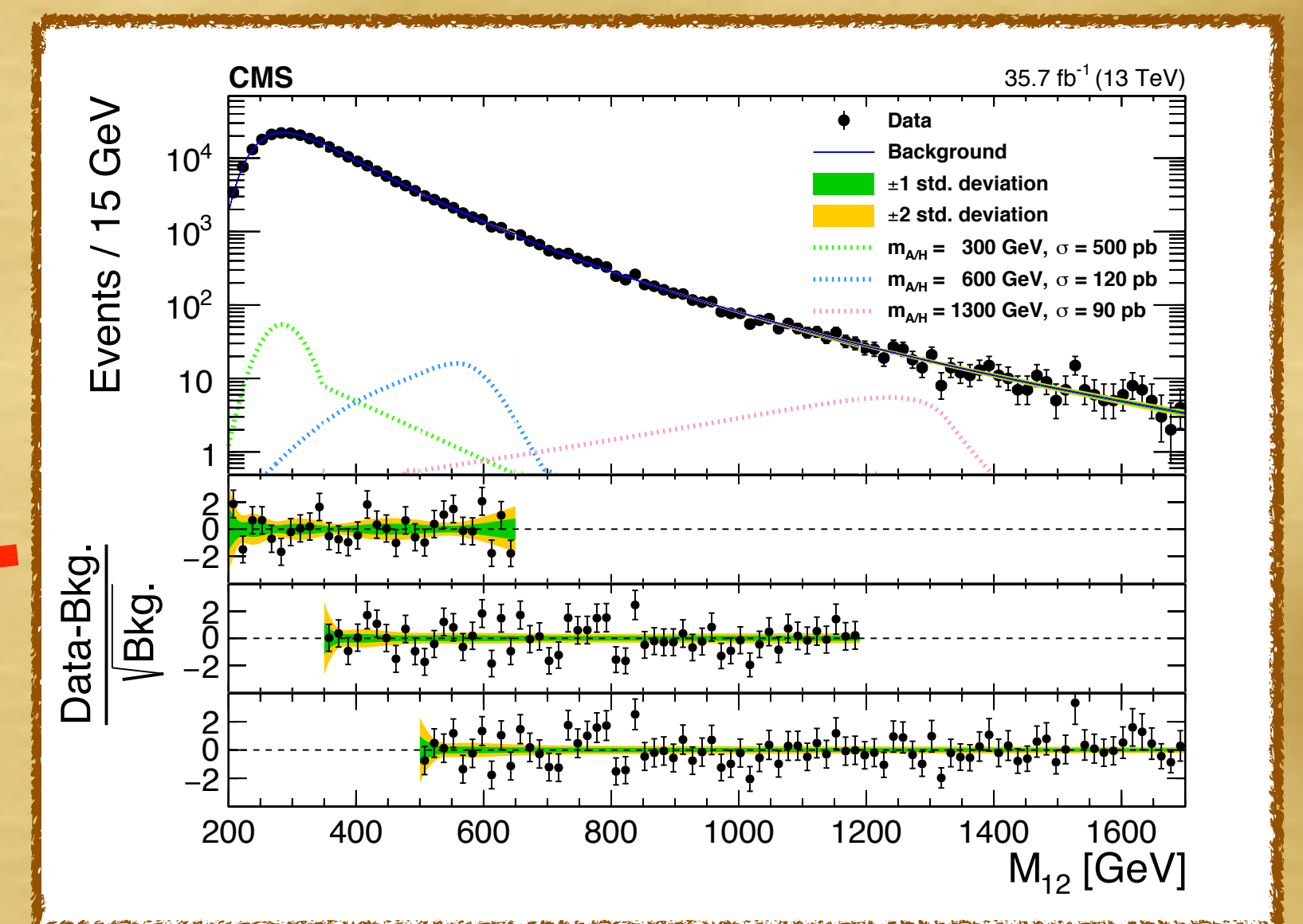
- ★ Control region (CR) : veto b-tagged on 3rd jet

Signal model

- ★ Signal reconstructed from invariant mass of the leading two b-jets (M_{12})
- ★ Monte Carlo: Pythia 8 LO + MadGraph 5 NLO for the corrections
- ★ Signal masses : $m_{A/H} = [300; 1300] \text{ GeV}$

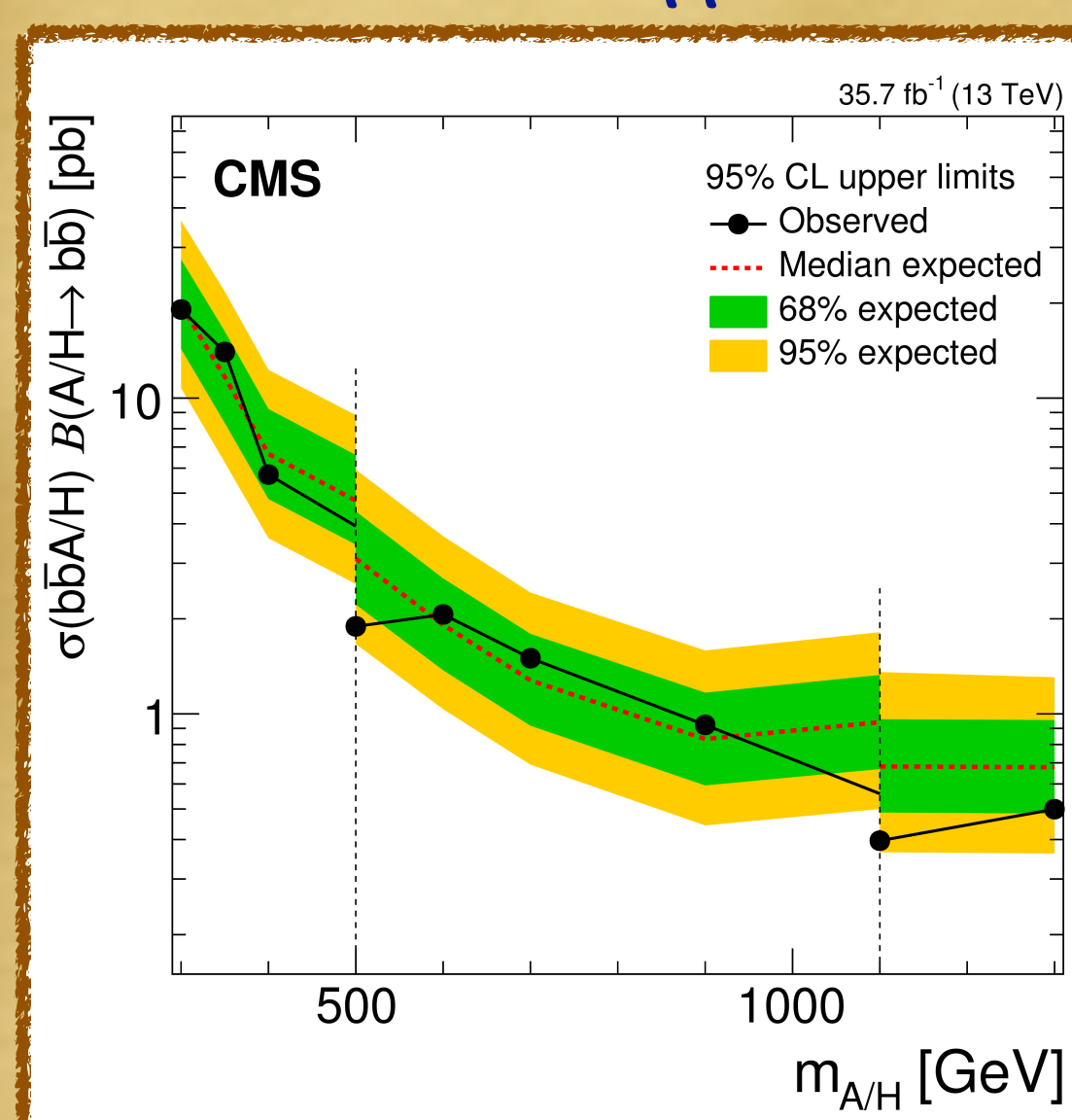
Background model fitted to data

- ★ Data-driven parametric approach developed in the veto b-tagged CR
- ✓ well-described by Novosibirsk-style functions
- ✓ subrange division designed to reduce bias uncertainty, improve sensitivity

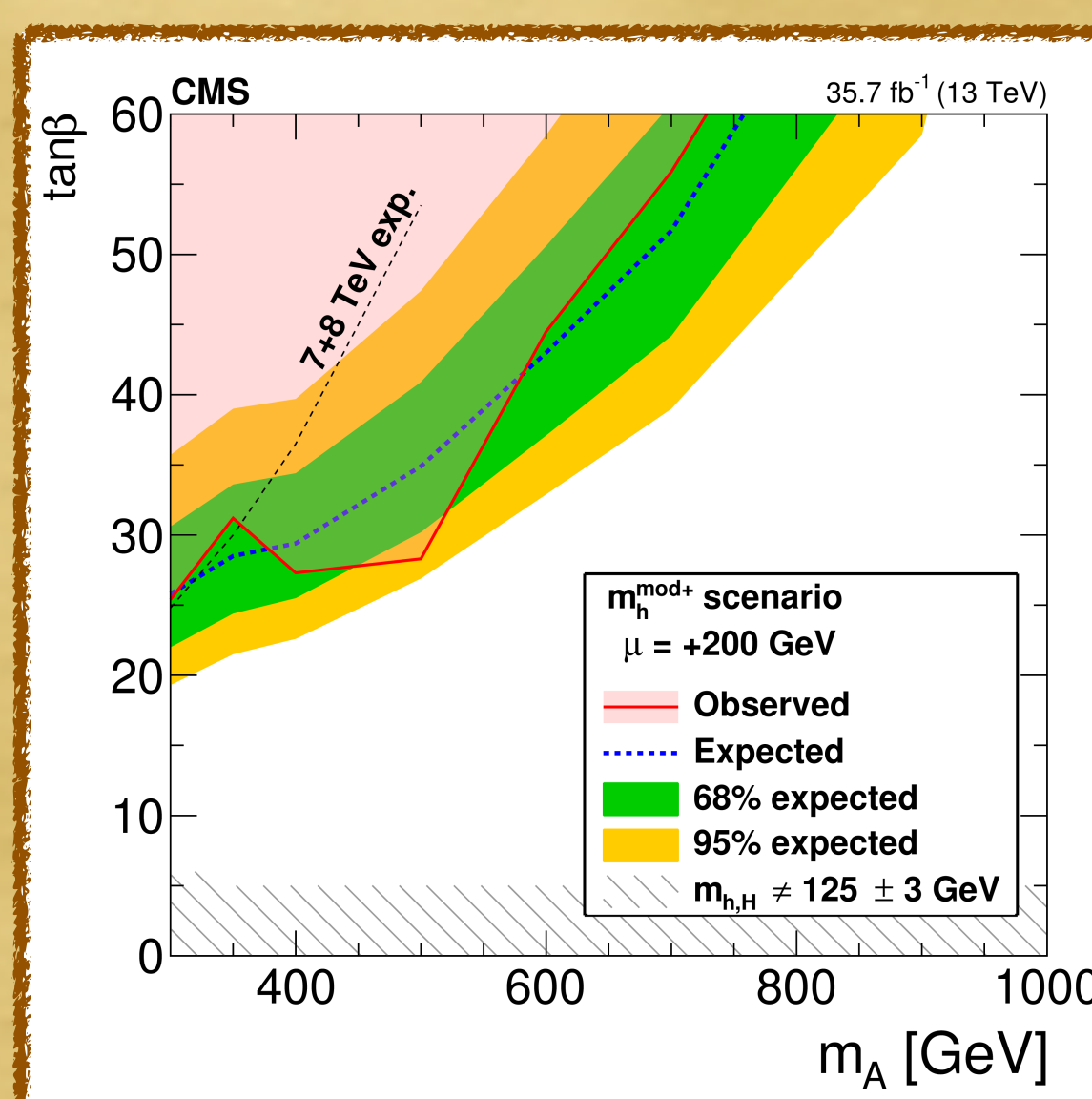


Reference
arXiv:1805.12191

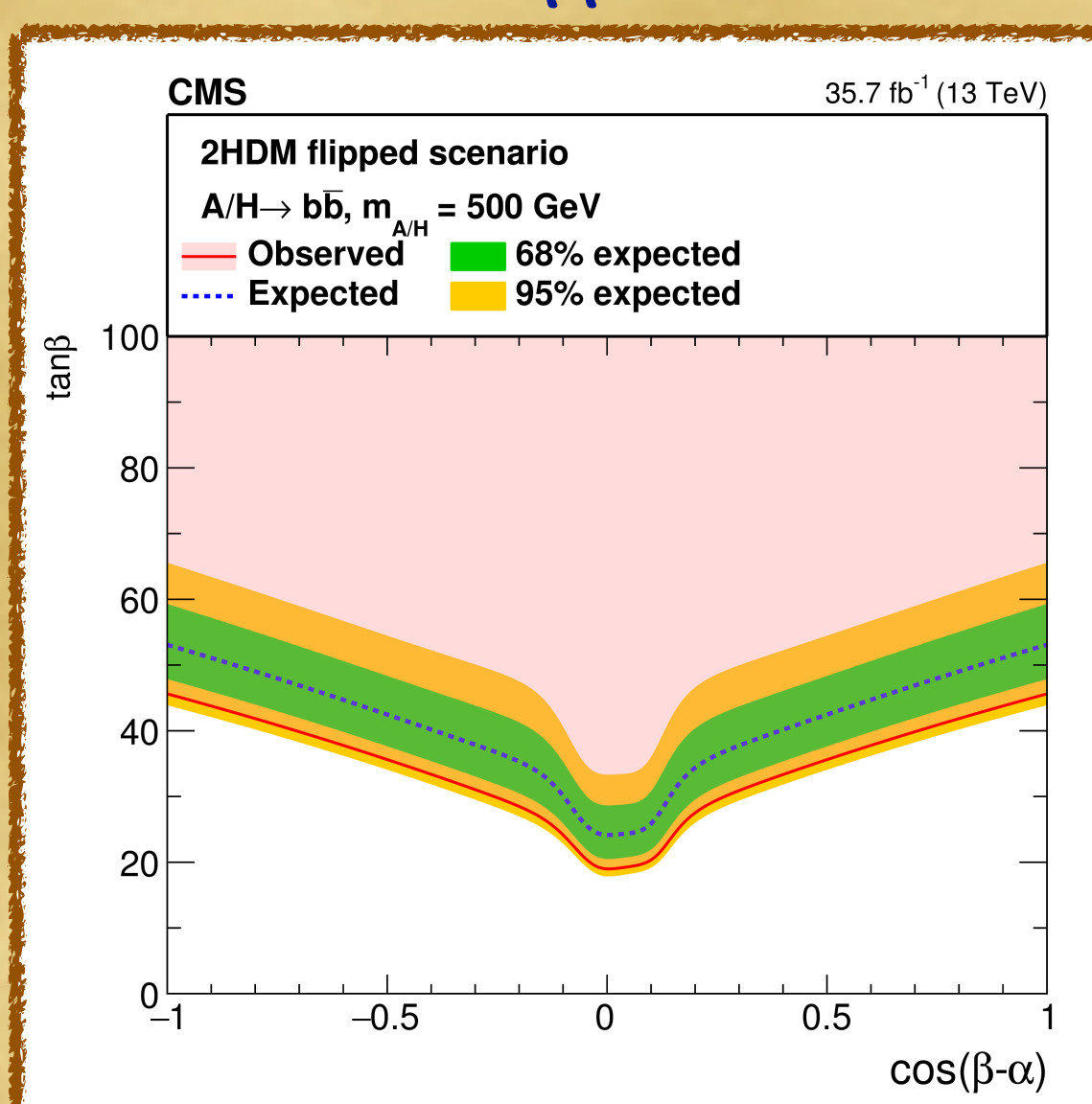
Cross-section upper limits



MSSM ($m_h^{\text{mod}+}$ scenario)



2HDM (flipped model)



Results

- ★ No signal is observed
- ★ Model-independent upper limits on cross-section times branching fraction at 95% CL are provided
- ★ Cross-section limits interpreted to exclusion limits on $\tan\beta$ vs m_A in MSSM and also $\tan\beta$ vs $\cos(\beta-\alpha)$ in the context of 2HDM flipped and type-II models
- ✓ achieved the best sensitivity in this channel to date
- ✓ unique limits for low $\cos(\beta-\alpha)$ of the flipped model

