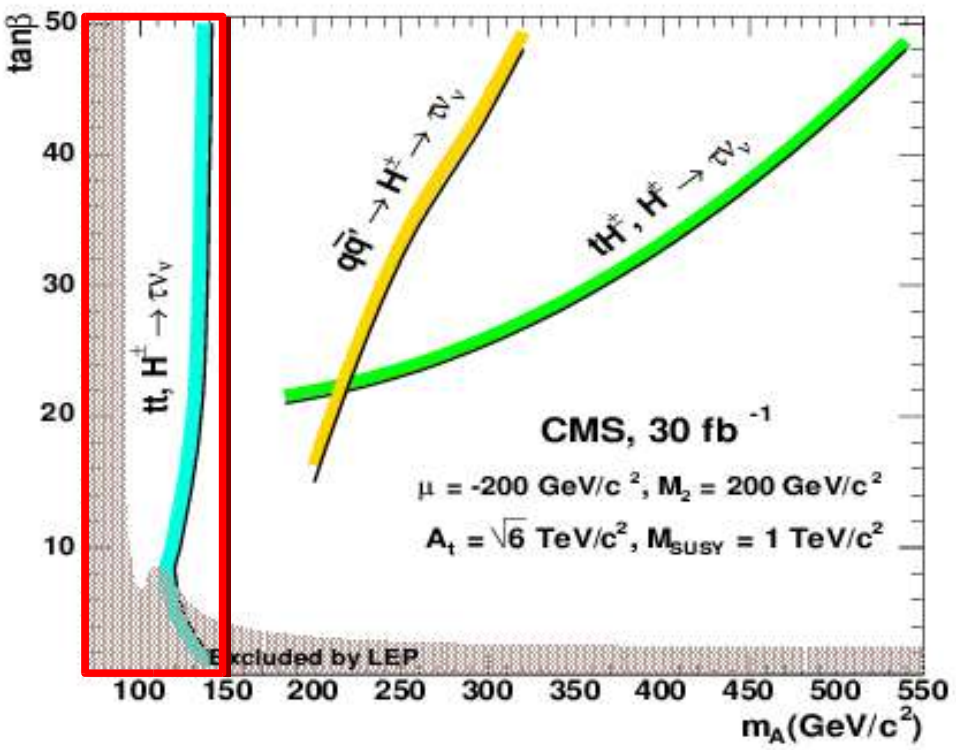
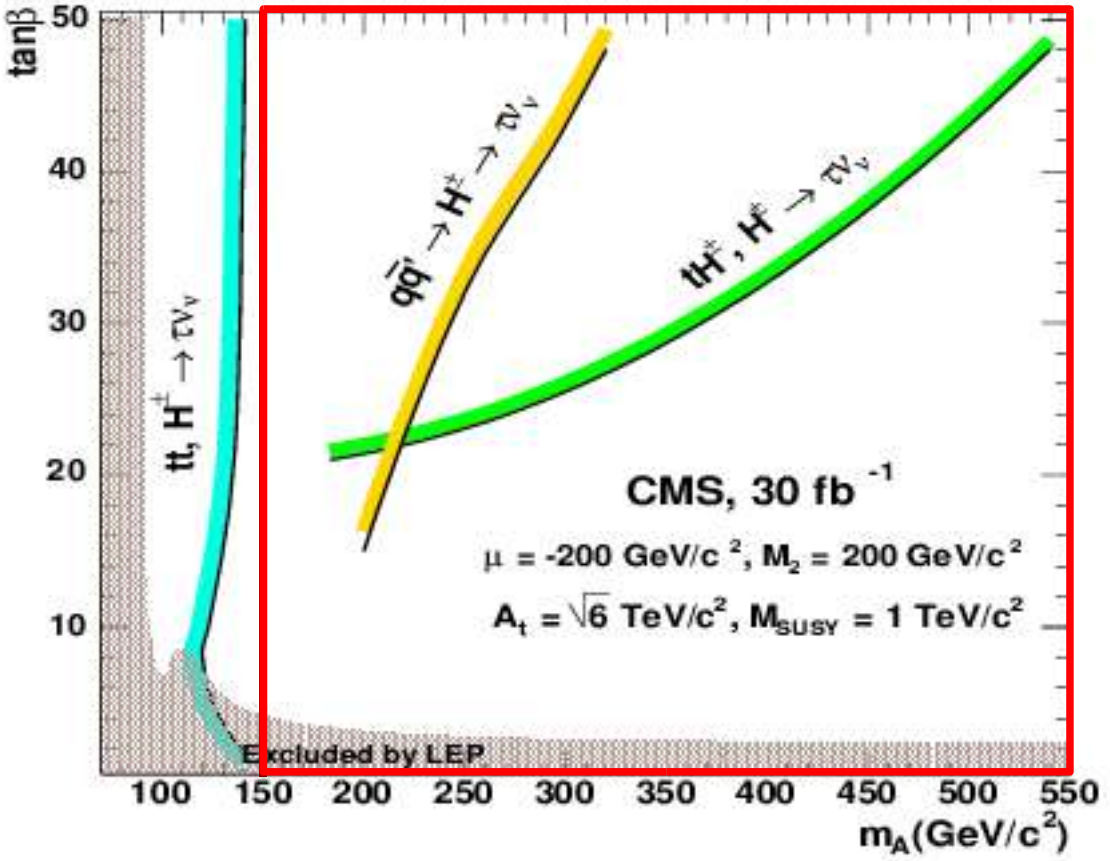
Discovery channels investigated by CMS

- Light $H^{\pm}$ (<Mtop)
  $gg(qq) \rightarrow tt \rightarrow H^{\pm}W^{\mp}bb$
  $H^{\pm} \rightarrow \tau\nu$
  - $W^{\pm} \rightarrow l\nu$ *(M. Hachemi, A. Nikitenko)*
    final state : 1τ, 2b, 1 lepton
    lepton trigger
  - $W^{\pm} \rightarrow qq$ *(S. Perries)*
    final state : 1τ, 2b, 2 light-jets
    transverse mass reconstruction
    with MET + τ–jet
- main background :
  $tt \rightarrow W^{\pm}W^{\mp}bb$



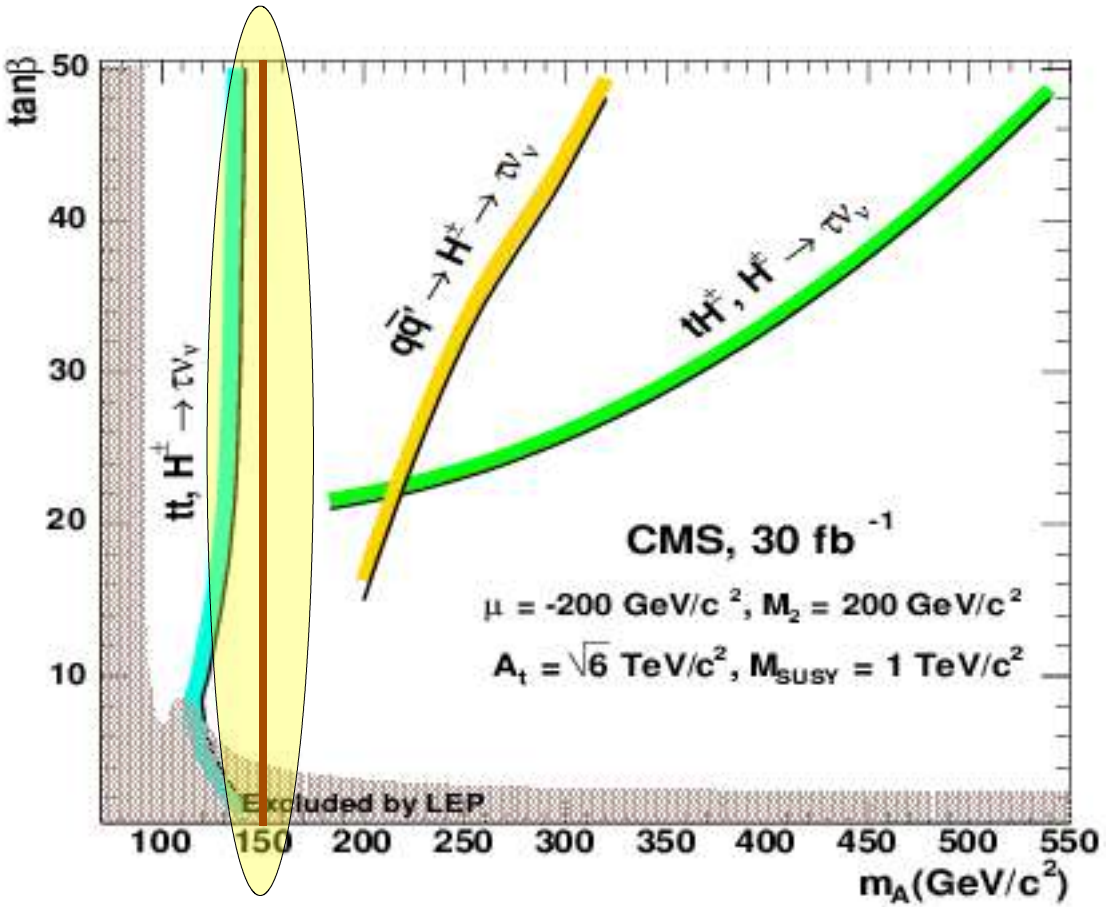
Discovery channels investigated in CMS

- Heavy $H^{\pm}$ (>Mtop) production : $gb \rightarrow H^{\pm}t$
  - $H^{\pm} \rightarrow \tau\nu$ *(R. Kinnunen)*
    final state : τ,b,MET
  - $H^{\pm} \rightarrow tb$ *(S. Lowette)*
    final state : 3b or 4b



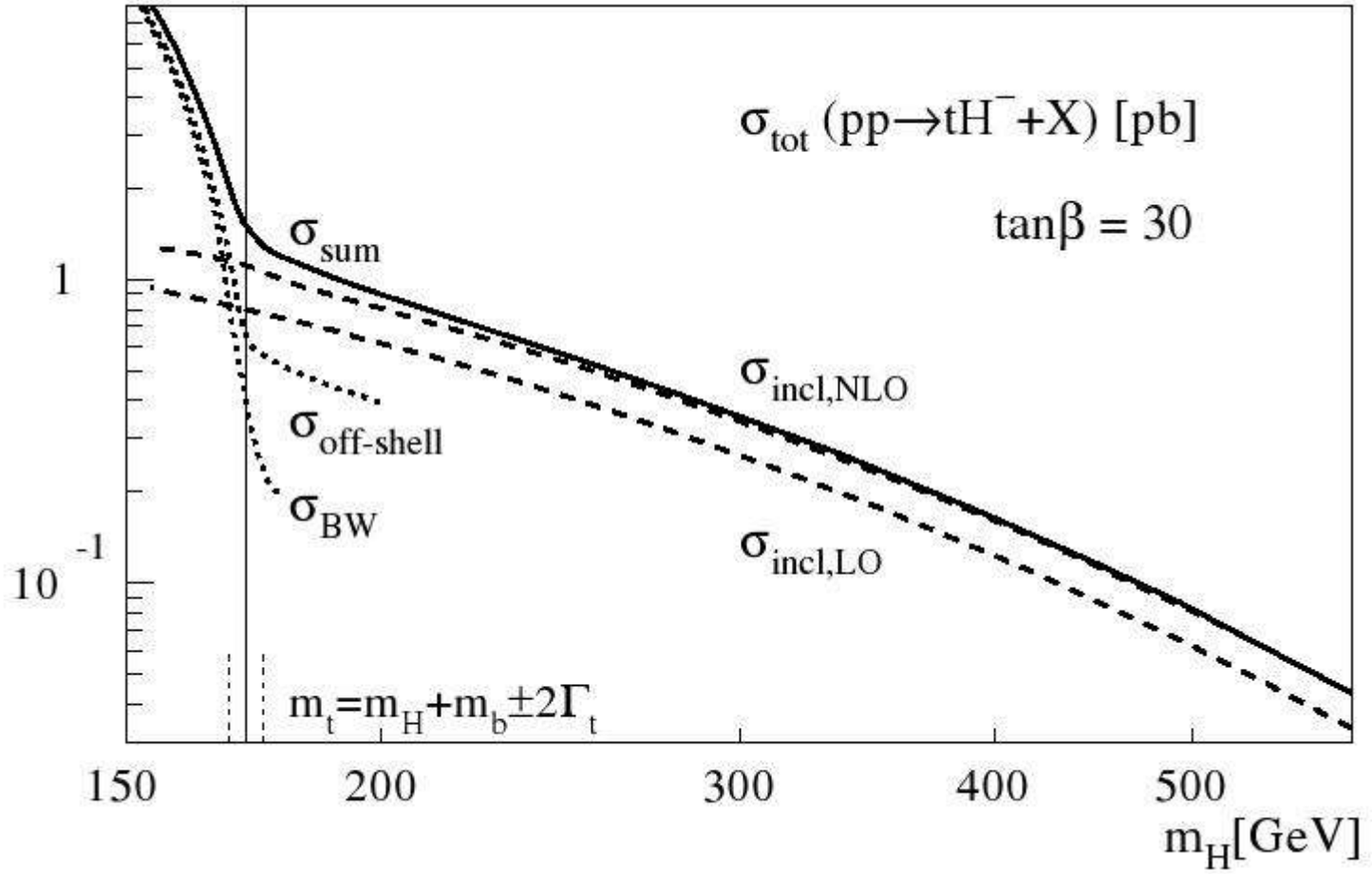
Intermediate region

- goal : cover the region around the top mass
- $gg \rightarrow tH^{\pm}b$ leads to the same final state as $tt \rightarrow WH^{\pm}bb$
- For $gb \rightarrow tH^{\pm}$ we will use Tilman Plehn NLO cross section calculation
  (hep-p/0312286)



Generation of events

- $gb \rightarrow tH^{\pm}b$ implemented in pythia
  Alwall and Rathsman, hep-ph/0409094
- external process pythia 6.226
  ISUB=401,402 ! gg(qq)->tHb
- generated with $t \rightarrow Wb$, $W \rightarrow l\nu$.
- generation in progress for purely hadronic final state.


σ_{tot} (pp→tH$^-$+X) [pb]
tanβ = 30
σ_{sum}
$\sigma_{incl,NLO}$
$\sigma_{off\text{-}shell}$
σ_{BW}
$\sigma_{incl,LO}$
$m_t=m_H+m_b\pm2\Gamma_t$
1
10^{-1}
150
200
300
400
500
m_H[GeV]