HH pair searches

combination with wwyy, bbyy, bbττ, bbbb

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and people from bbττ, bbbb, bbyy

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IHEP

CDS entry
[wwyy]https://cds.cern.ch/record/1967498
[bbττ]https://cds.cern.ch/record/1967500
[combination]https://cds.cern.ch/record/1984111/

Higgs approval:
https://indico.cern.ch/event/387805/

Combined limits (interpolated points)

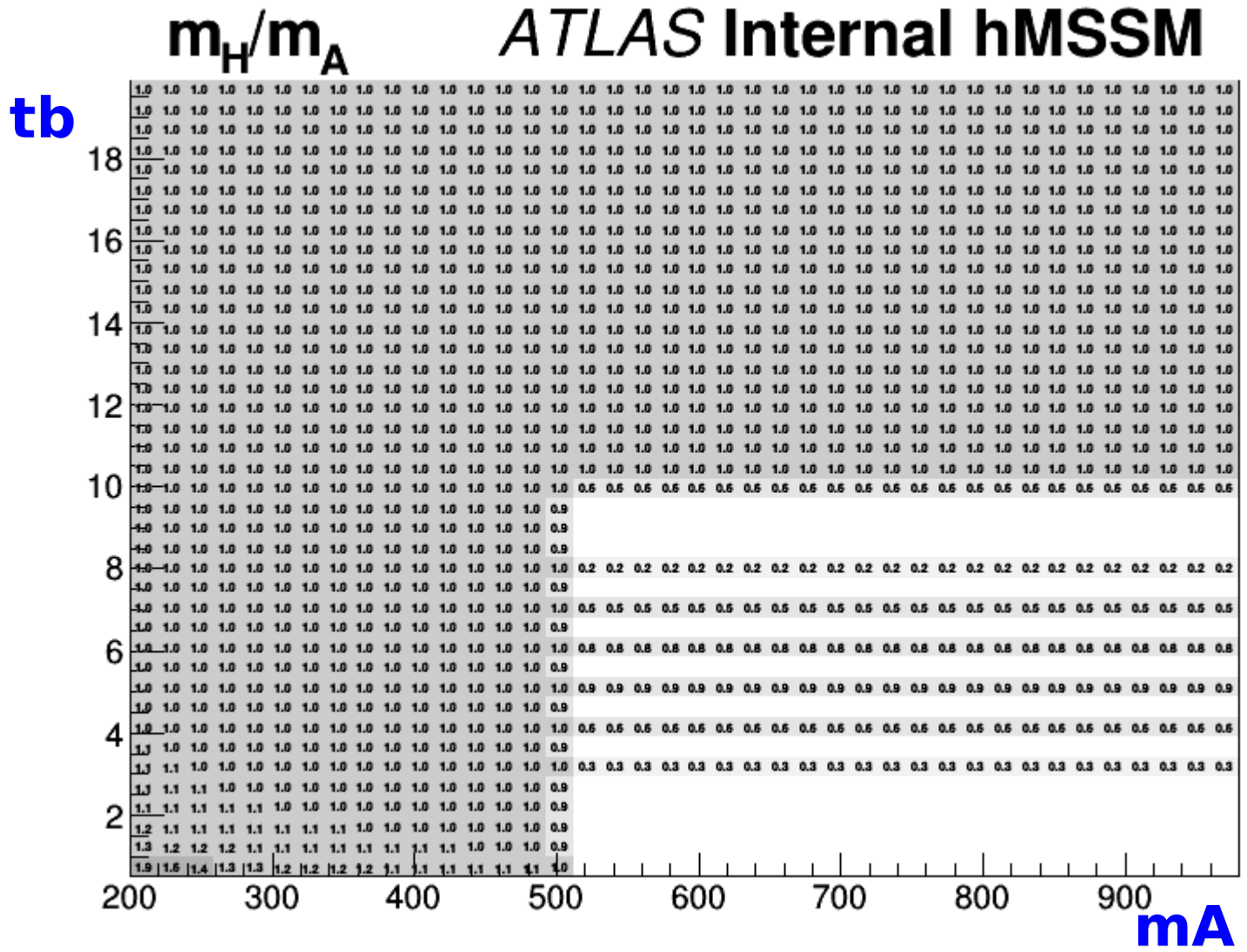
- With the interpolated mass points, that are ready in low mass region by Keita, the combined limits are obtained by toys
- But we found that there is a bug (the parameter to rescale the BR(h-tautau) is set to **free**, but should be **constant**)
- Now running checks with this parameter set to constant, nothing seems to be wrong, so will continue to calculate limits with toys
- Limits&p0 in low mass region should be available in the beginning of this week:
  - Li Qi is running on grid for limits
  - I am running at ihep for p0
- We expect high mass ws coming soon from Keita

Interpretation

- 2HDM interpretation will not be possible due to width issue and lack of manpower to smear in bbyy
- hMSSM and low-tb-high are proposed
- For hMSSM , we have a preliminary ntuple from Allison recording xsec and br, but it is probably **buggy** informed by Nikos just this evening (still need double check); Carl started a script to run with this ntuple for interpretation. I will also devote to this
- For low-tb-high, xs and br numbers are avalaible, but not yet packed into ntuple for an easy reading format, relative long way to go ...

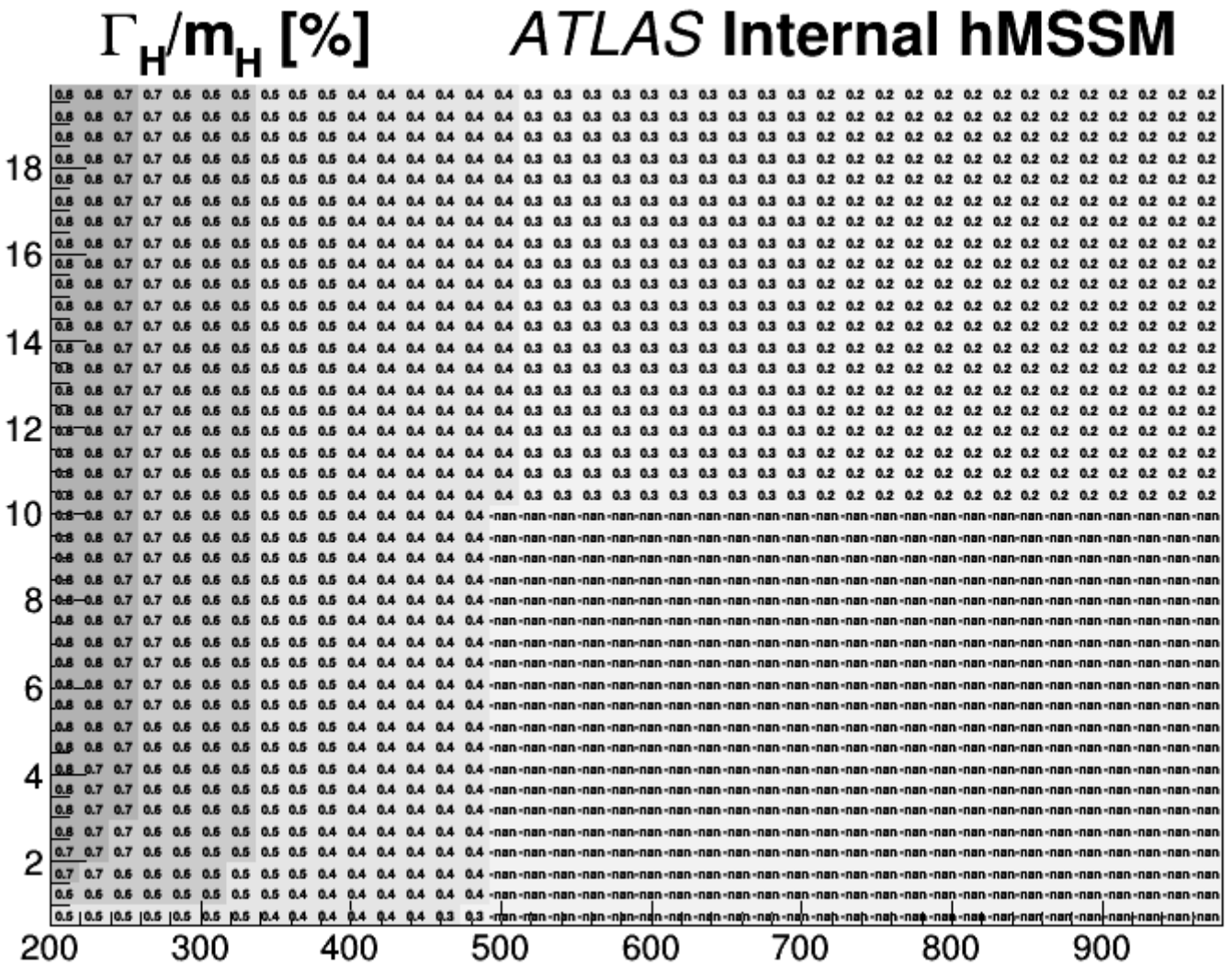
hMSSM

- only two parameters mA and tanb
- mH is varying around mA, should not be a problem



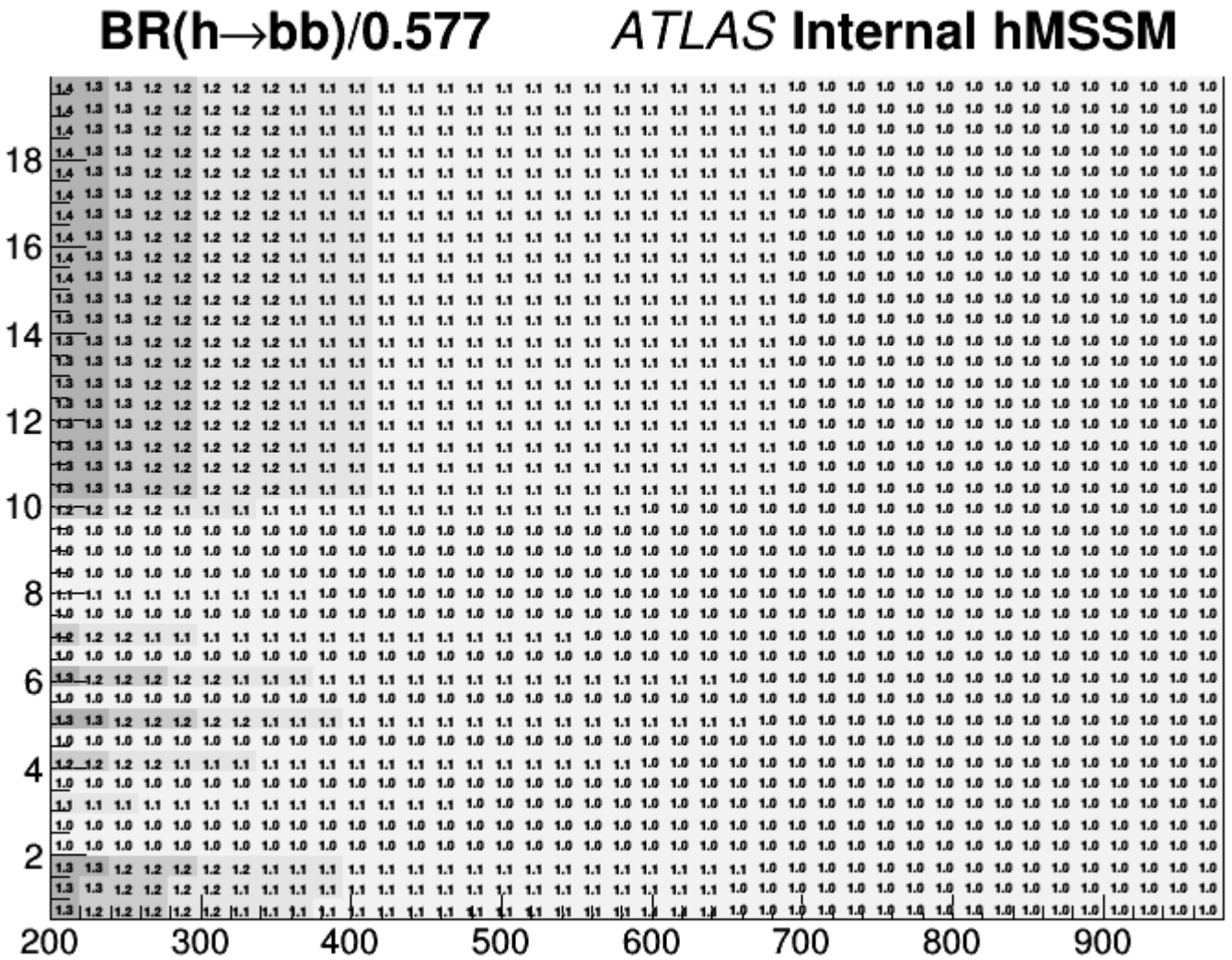
hMSSM

- only two parameters mA and tanb
- width should not be an issue in general



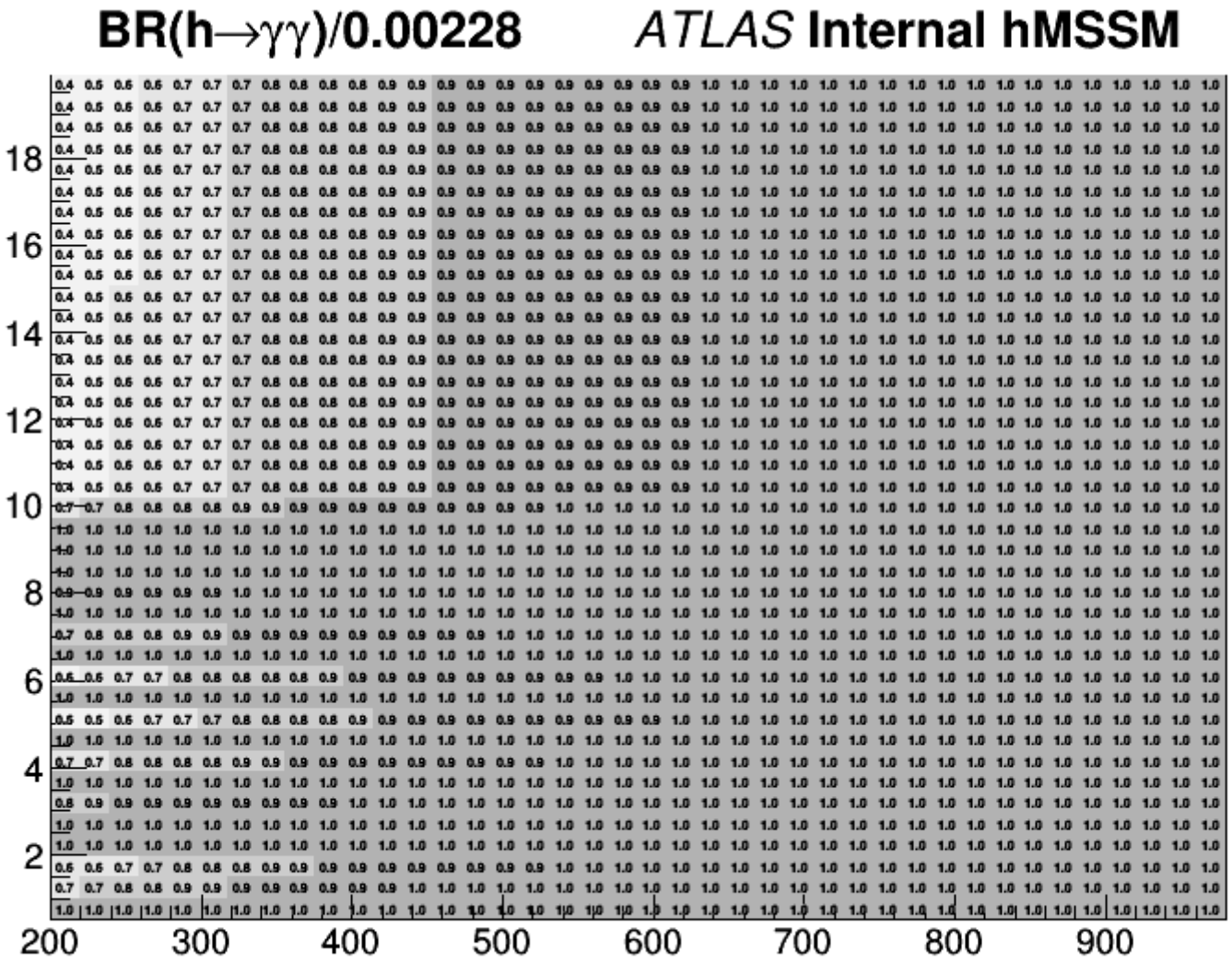
hMSSM

- only two parameters mA and tanb
- BR(h-bb)/0.577 <40% variation



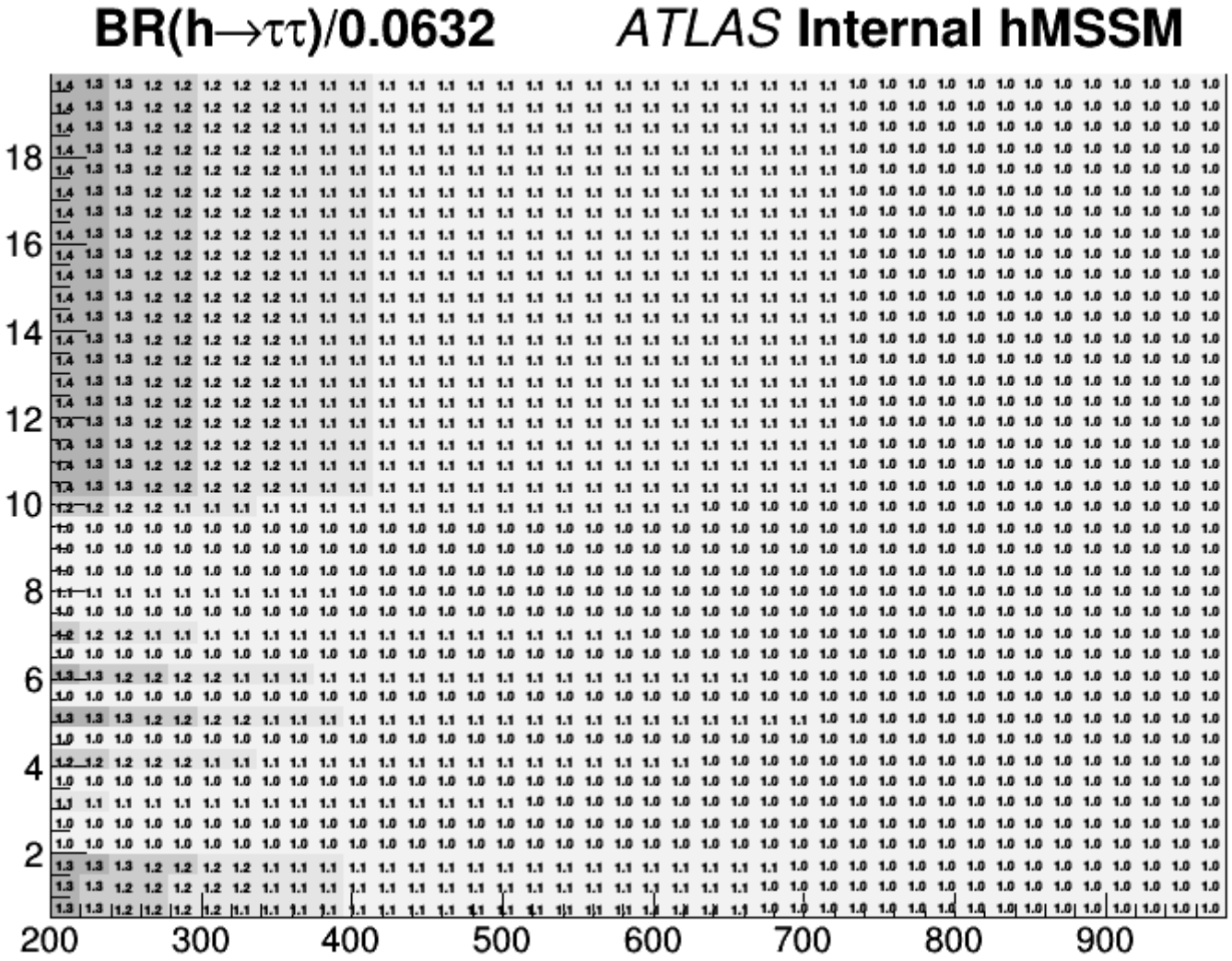
hMSSM

- only two parameters mA and tanb
- BR(h-yy), variations are relatively larger



hMSSM

- only two parameters mA and tanb
- BR(h-tautau) variation ~40% at most



hMSSM

- only two parameters mA and tanb
- BR(h-WW) variation ~50% starting from 260GeV