Two Higgs Doublets Models, SUSY
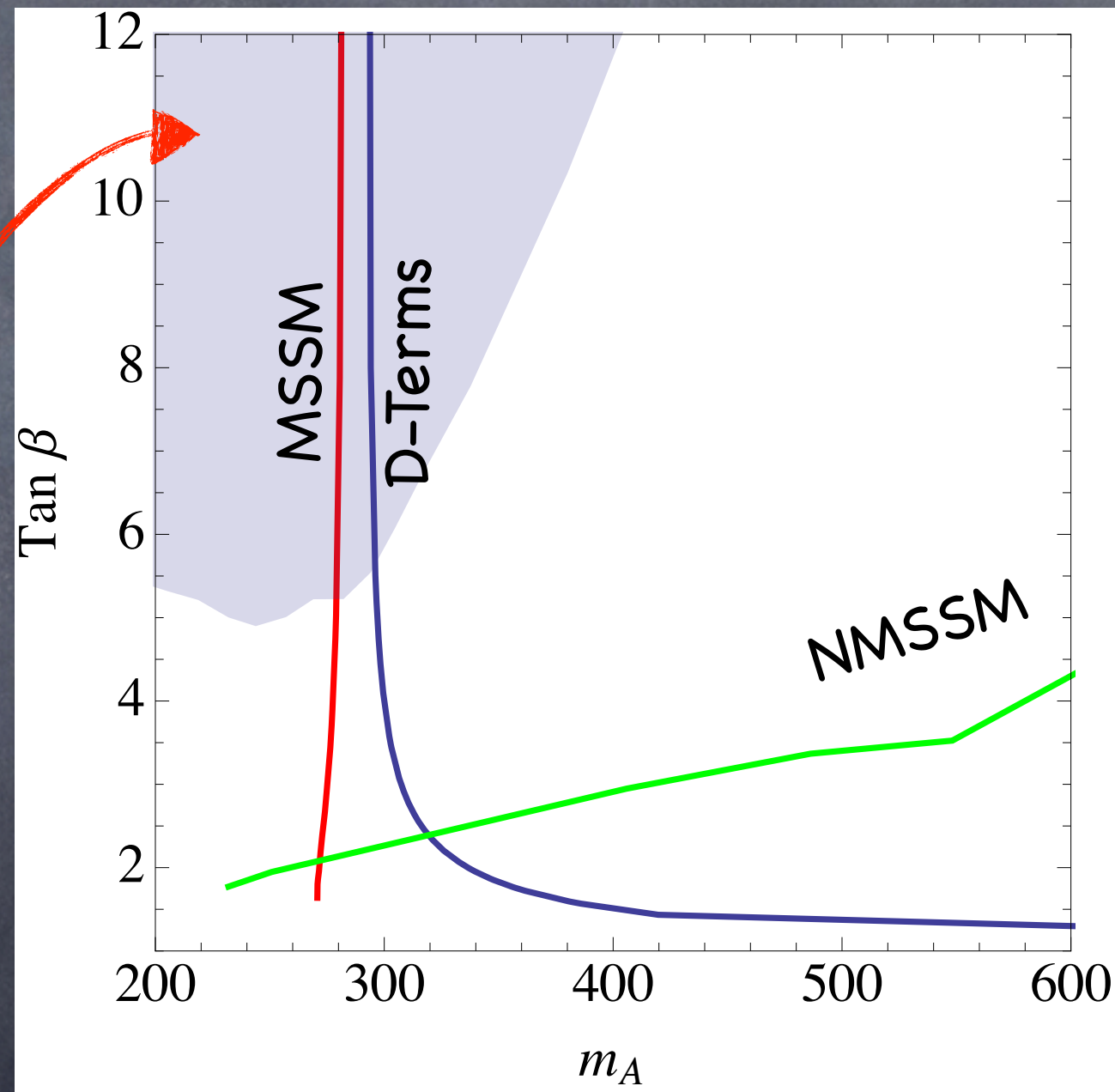
Nevertheless, no deviations imply:

$H \rightarrow \tau\tau$
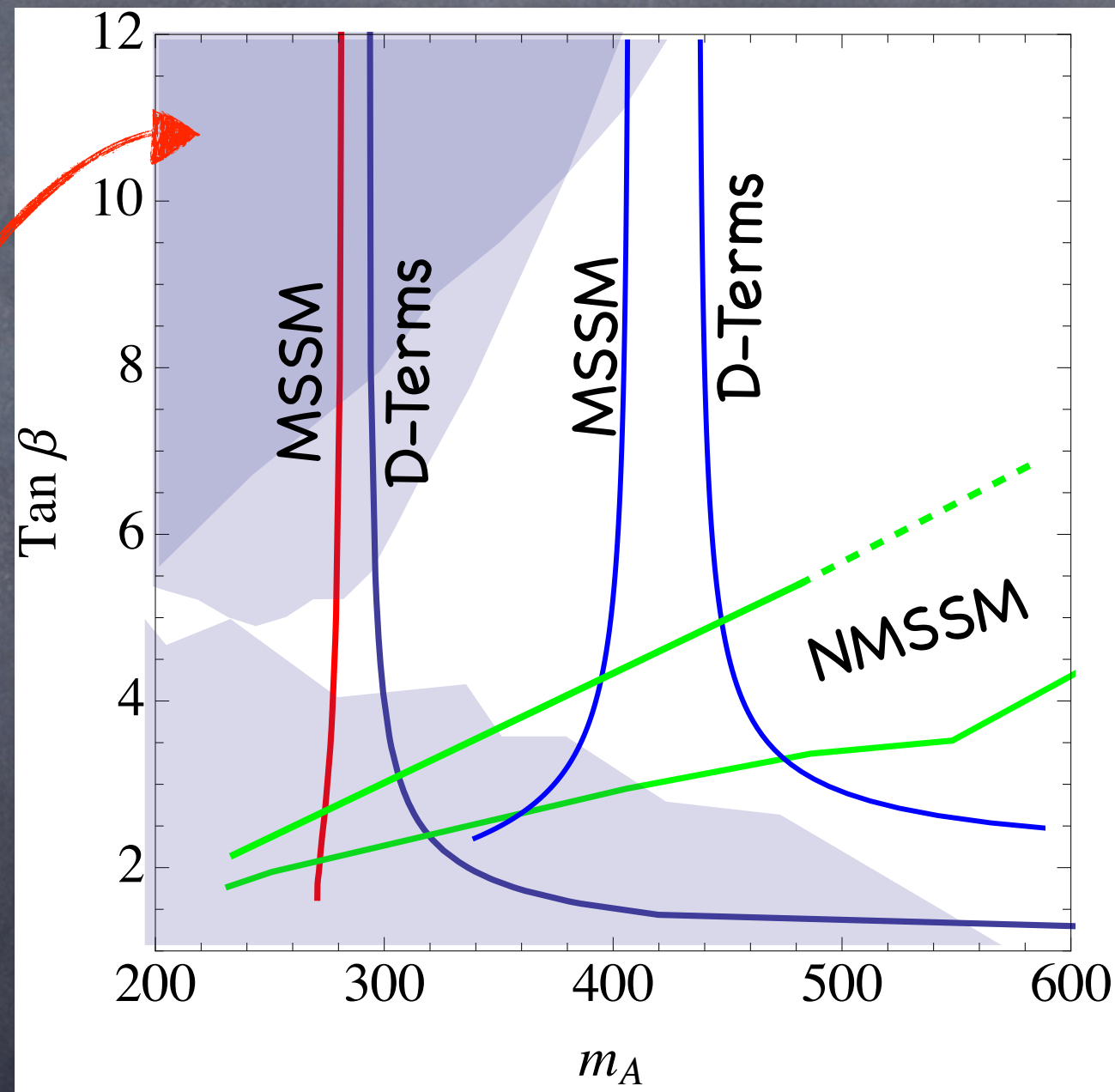
Blum,D'Agnolo,Fan'12 ;D'agnolo,Kufflick,Zanetti'12;
Peskin'12; Linssen et al.'12; Montull,Gupta, FR, '12

Two Higgs Doublets Models, SUSY
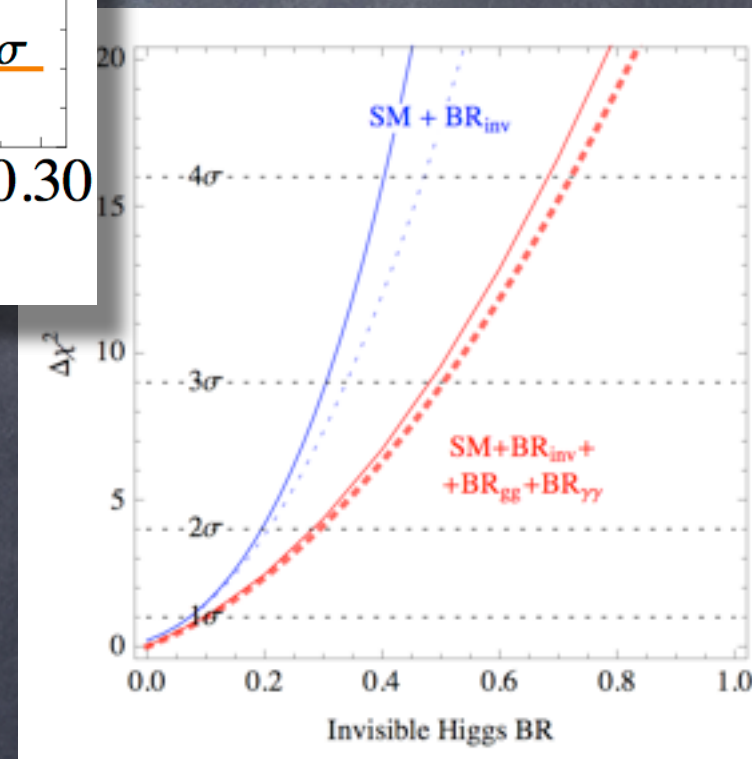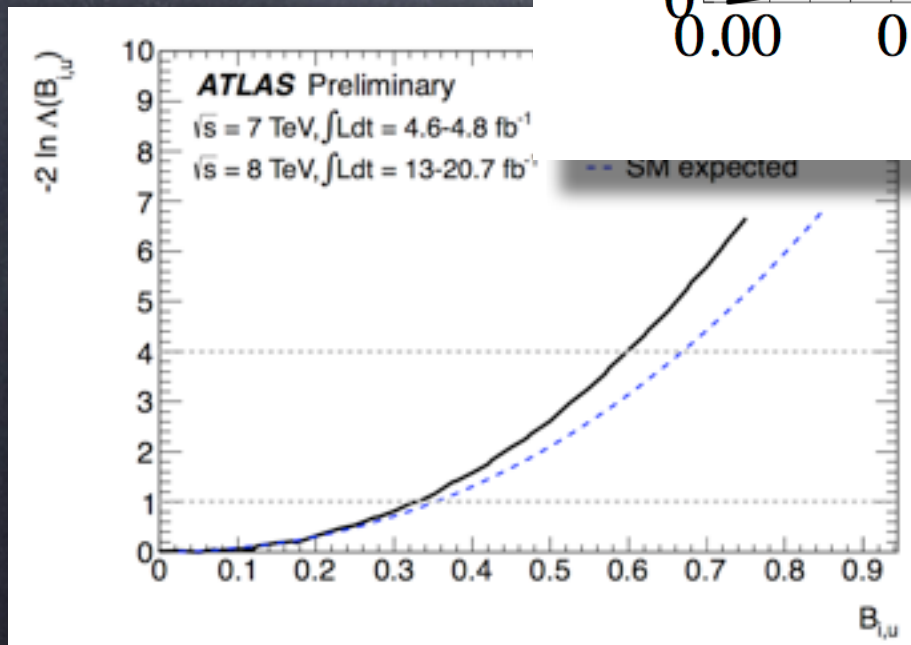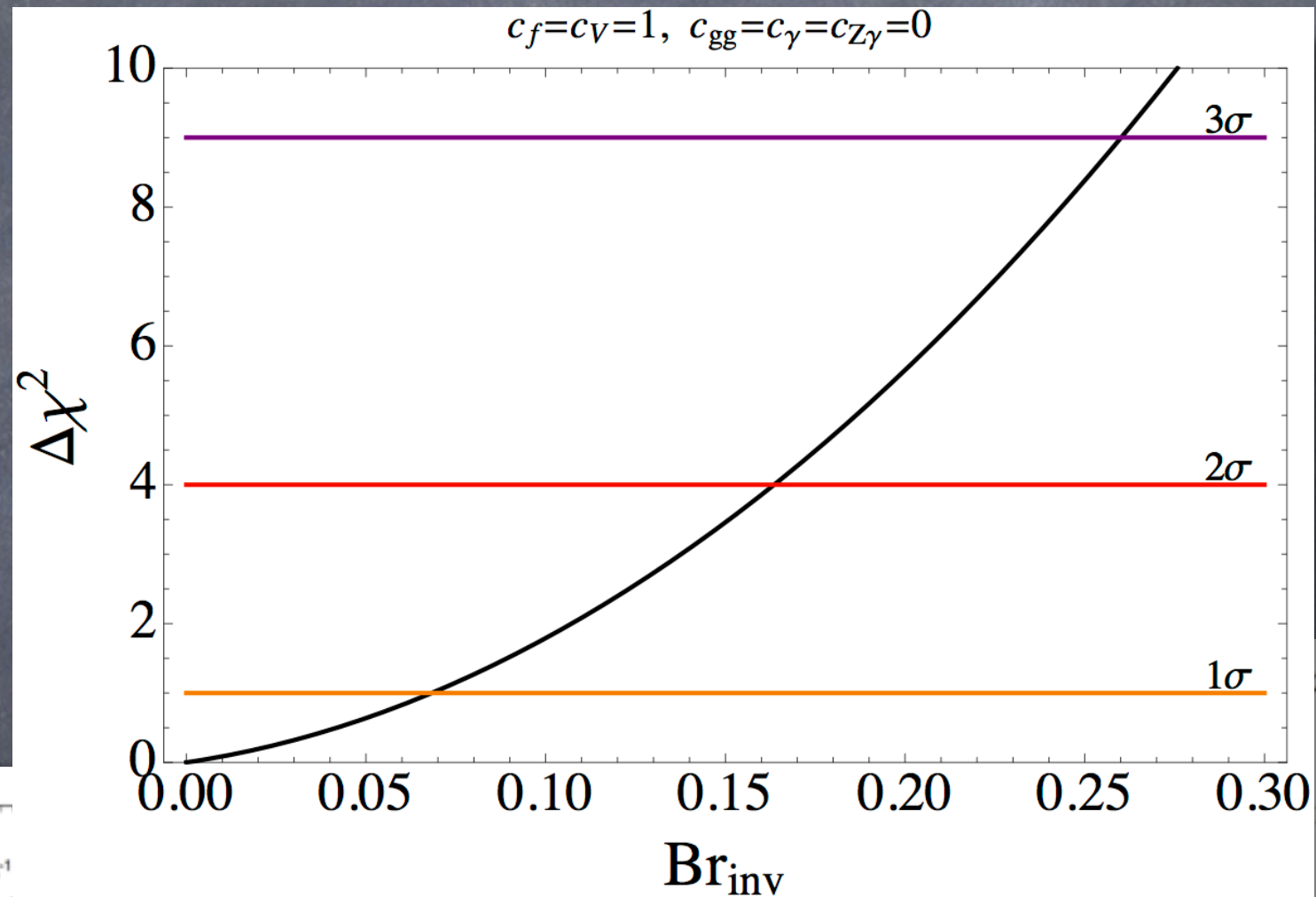
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3. DM

Scalar DM and the "Higgs portal"
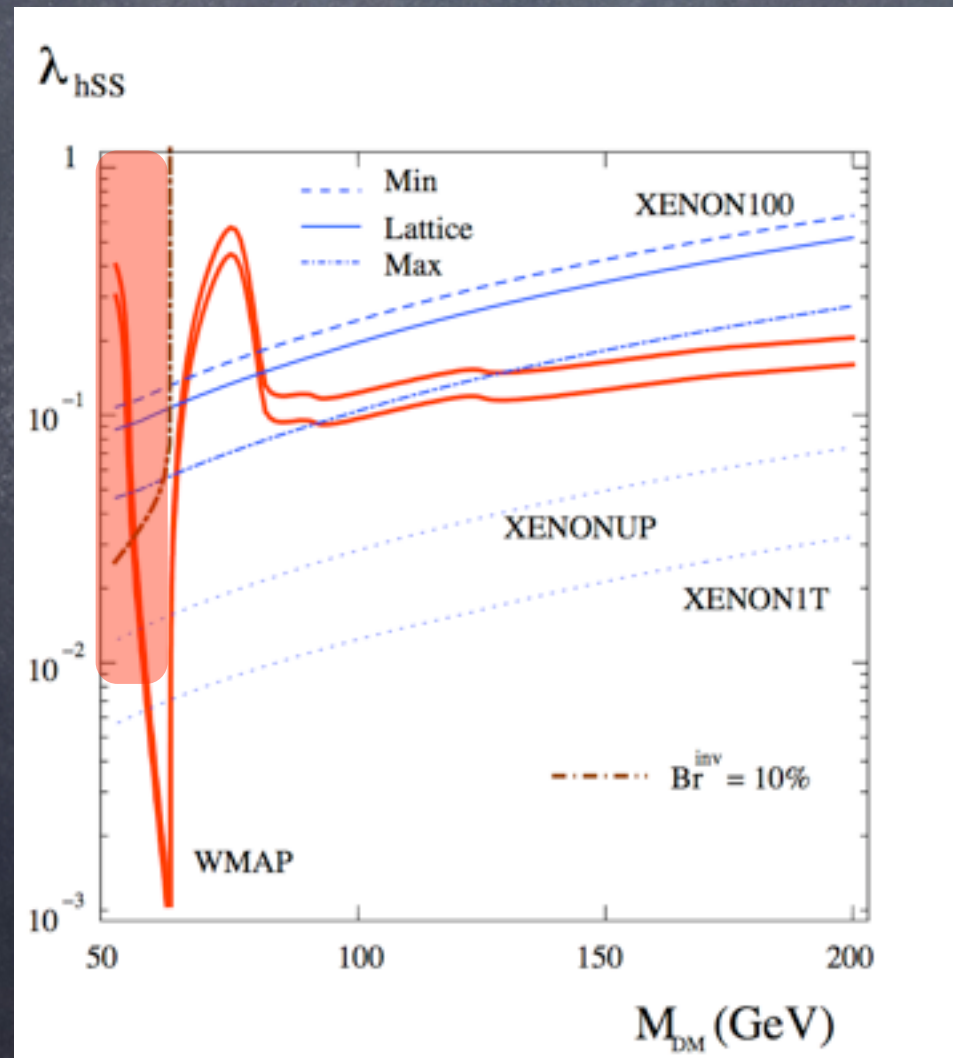
Invisible width strongly constrained:

$c_f = c_V = 1, \ c_{gg} = c_\gamma = c_{Z\gamma} = 0$

Scalar DM and the "Higgs portal"

Elementary scalar DM

$$\mathcal{L} = \frac{\lambda}{2} h^2 S^2 + \cdots$$

Composite scalar DM

$$\mathcal{L} = \frac{\lambda}{2} h^2 S^2 + \frac{h \partial h S \partial S}{f^2} + \cdots$$

Djouadi,Mambrini,Lebedev,Quevillon'11;
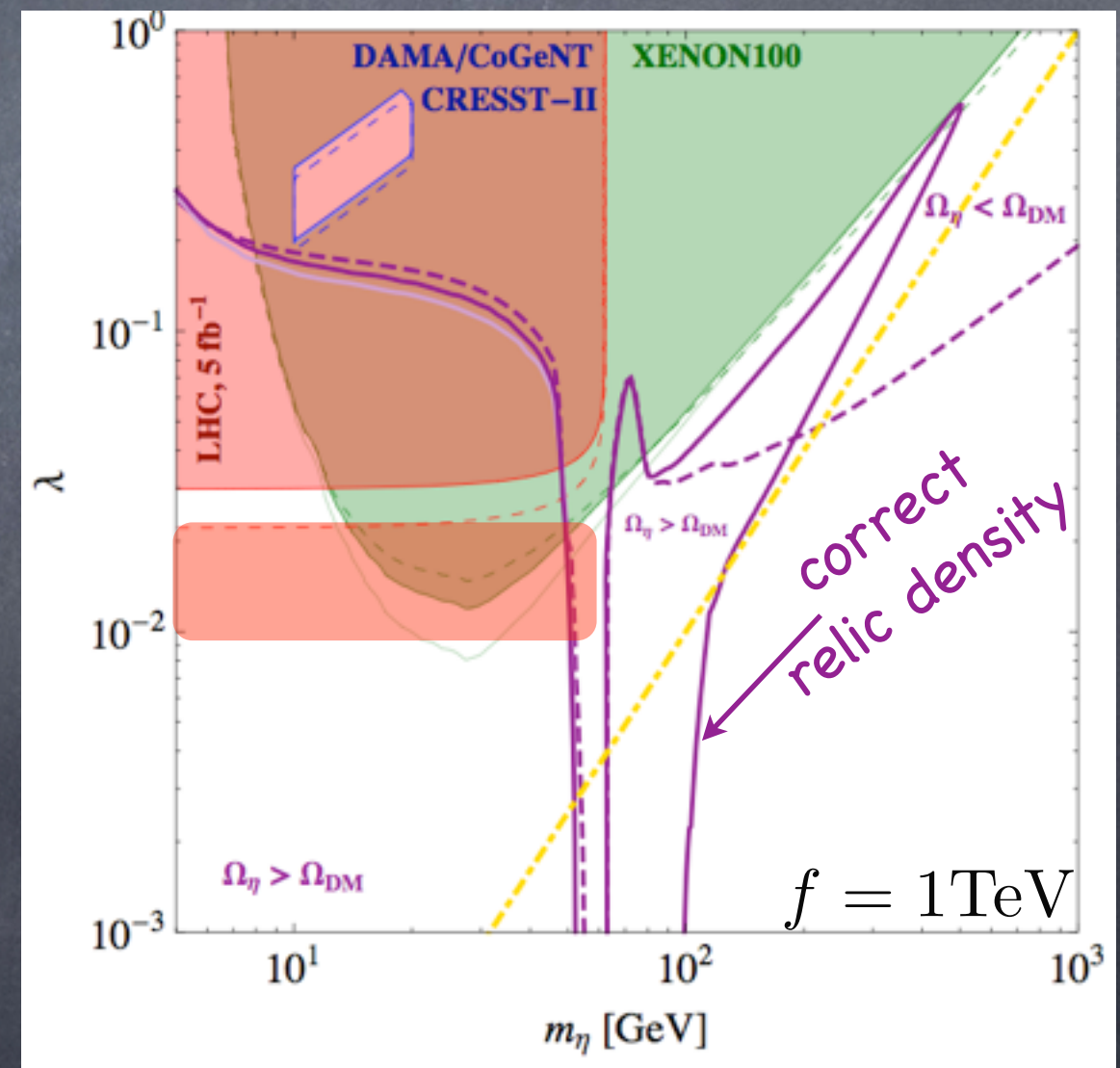
Frigerio,Pomarol,FR,Urbano,'12;

Conclusions

- It is a Higgs (responsible for EWSB)

- EWPT constrain possible deviation in Higgs couplings

- It looks like the SM Higgs, but non-SM Higgses look also like a SM Higgs...

- SUSY and Compositeness: bounds not yet constraining
  Best evidence: top partners