

# An (on-shell) BSM Theorist's Wish List\*

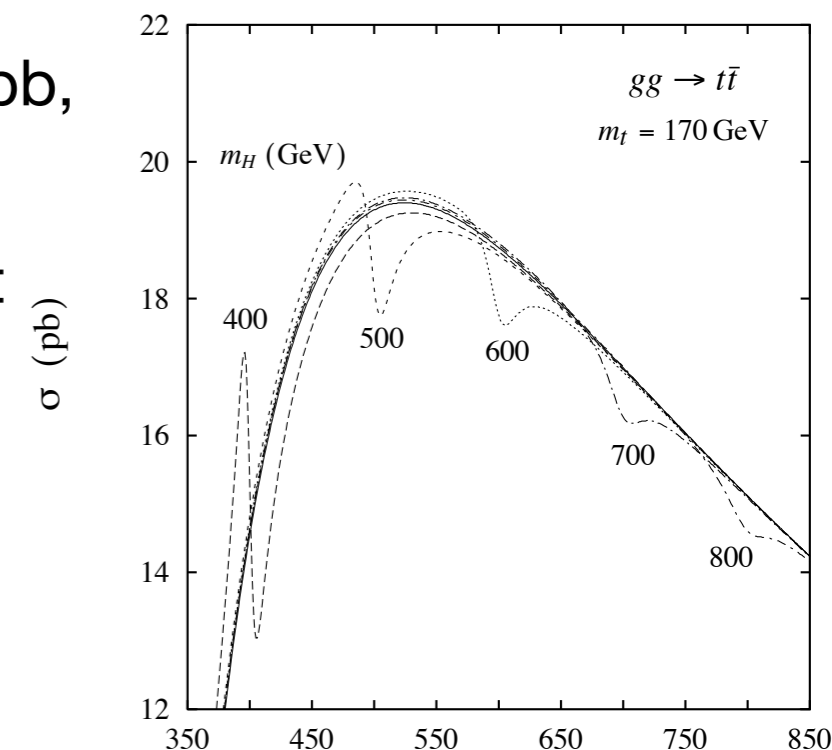
\*Not fully representative; lots of great BSM talks in this workshop!

## SM-BSM Matching

- Search for new physics in the Higgs sector raises new opportunities/challenges at the interface of SM physics and BSM physics - both experimental and theoretical.
- Role for everything: SM precision, specific BSM frameworks, simplified models. Great opportunity (and necessity) for integrating cultures.

## Extended Higgs Sector

- First step: single-X topologies. Covering  $X \rightarrow \gamma\gamma$ ,  $X \rightarrow \tau\tau$ ,  $X \rightarrow bb$ ,  $X \rightarrow VV$ ,  $X \rightarrow hh$ ,  $X \rightarrow Zh$ . Remaining targets:  $X \rightarrow tt$ ,  $X \rightarrow \text{invis}$ .
- $X \rightarrow tt$  is the Holy Grail of extended Higgs searches. Also: get to look for deficits?
- Next steps: XX topologies; X topologies below h(125).
- $\sigma \cdot \text{Br}$  limits great; given more time, also finite width effects, model interpretations.



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## BSM Higgs Production

- Great progress on SUSY/CHM exotic production (e.g. higgsino,  $t'$ , etc.); thank you! Other motivated sources of BSM production? Room for generic Higgs+X searches?

## BSM Higgs Decays

- Prompt exotic decays of  $h(125)$ : many opportunities! But some opportunities will become harder with triggers at 13/14 TeV, so some urgency.
- Displaced decays of  $h(125)$ : Looking great! ATLAS: Hcal/Ecal or muon chambers; CMS: tracker. Lots of opportunities:  $h(125)$  interpretation of CMS search? Associated production? Strategies for flexible re-interpretation?
- Invisible decays of  $h(125)$ :  $tth \rightarrow$  invisible?  $hj \rightarrow$  invisible? Off-shell Higgs?
- Invisible decays of BSM Higgs: “scalar”  $GG\chi\bar{\chi}$  DM operator (best monojet+MET limit) *is* a BSM Higgs scalar. Relevance of BSM Higgs group to DM searches.
- Many opportunities in flavor-violating couplings, consistent with flavor bounds.

## Now vs. Later?

- Prioritize the things we'll lose going from 8 TeV to 13/14 TeV.