BSM Higgs → μμ
Status and Plans

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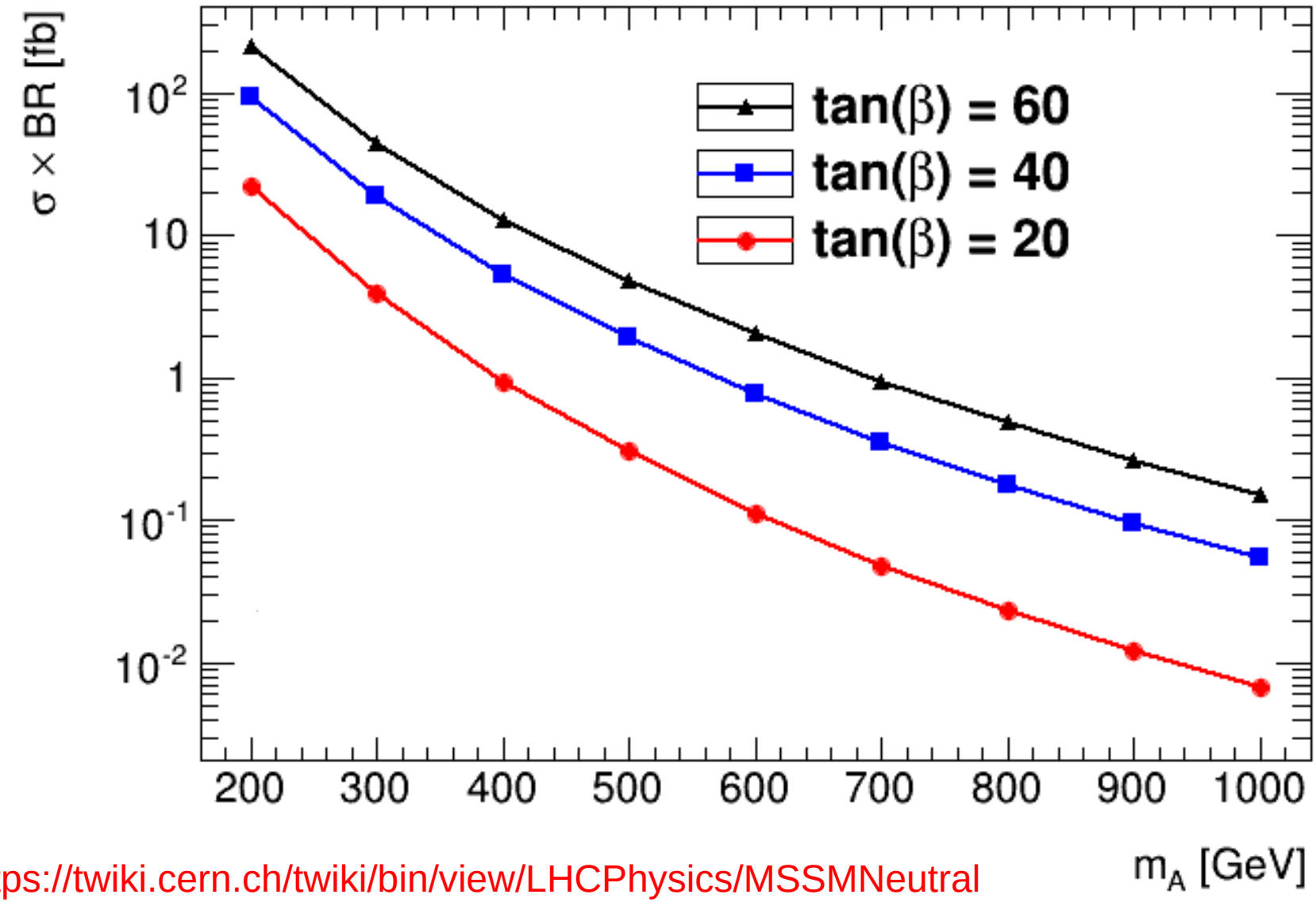
Introduction

- Goal: understand sensitivity to BSM Higgs sector with 300 and 3000 fb^{-1} at the 14 TeV LHC with ATLAS
  - Specifically μμ channel
  - Expect to be sensitive in ττ channel first
  - μμ is simpler and important for lepton universality, coupling verification, etc.
- MSSM (m^h_{max}) predictions for A → μμ cross sections for various values of tan(β) and m_A
- Determine number of sigma deviations from SM predicted by MSSM → use this as measure of physics potential of luminosity upgrade.
- Unfortunately, plots are not approved yet, so I'll give an outline of what we've done and our ongoing work. **Work in Progress!**

A → μμ Details

- A → μμ cross sections taken from https://twiki.cern.ch/twiki/bin/view/LHCPhysics/CrossSections
- Both ggF and bbA contributions to cross section are important.
- SM background: $Z/\gamma^{*} \rightarrow \mu\mu$
- Analysis fairly similar to ATLAS ESG results for Z' → dilepton high-mass resonance search (ATL-PHYS-PUB-2013-003)

A → μμ Cross Sections



https://twiki.cern.ch/twiki/bin/view/LHCPhysics/MSSMNeutral

A → μμ Details

- Event Selection:
  - Exactly 2 “good” muons
  - At least one must fire the trigger
  - Must be oppositely charged
- Using background-only and signal+background templates, calculate the stat-only p_0-value (converted to gaussian number of standard deviations) used to compare 300 and 3000 fb^{-1} of LHC running.

A → μμ Summary

tan(β)	m_A	Expected nsigma Deviation (300 fb^{-1})	Expected nsigma Deviation (3000 fb^{-1})

Up For ATLAS Approval

Conclusions

- Analysis is fairly mature:
  - We have spectra and can calculate deviations from the SM.
  - Most of PUB note is written—currently responding to comments.
- Expect results to be public in time for Minnesota.