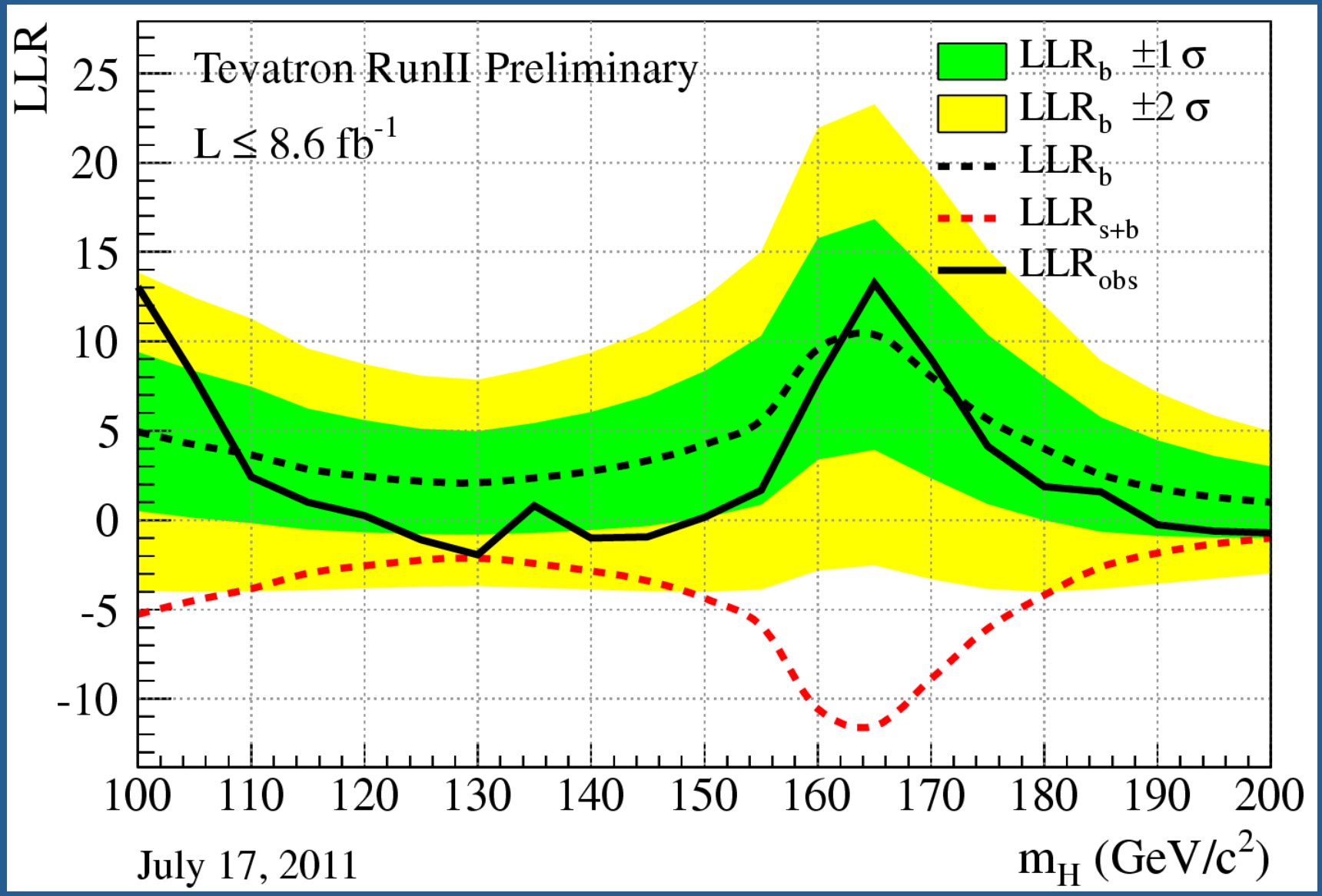
S+B versus B-only Hypotheses

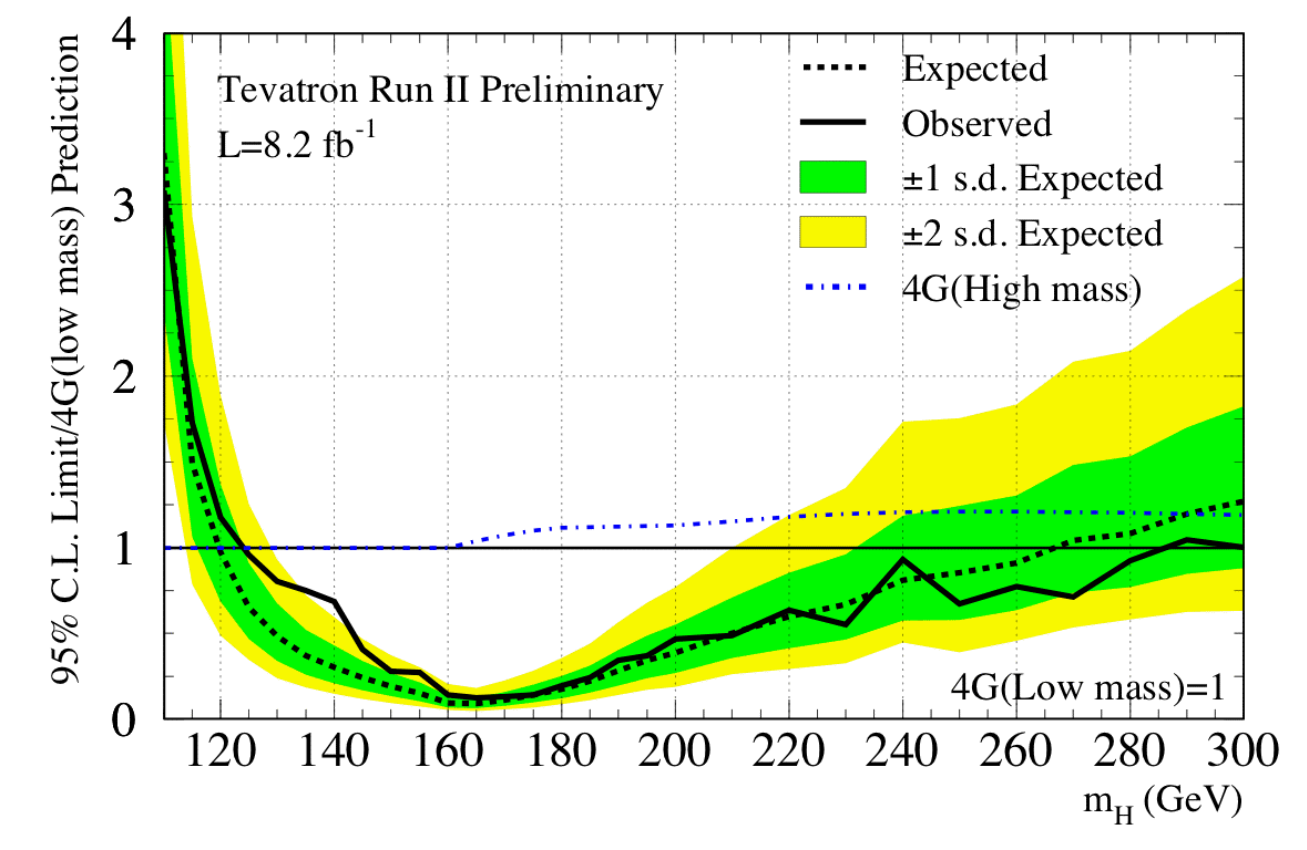


Theoretical Uncertainties

- Latest theoretical cross sections (NNLO) and branching ratios (HDECAY), including the corresponding uncertainties.
- MSTW 2008 NNLO parton distributions (PDF) as recommended by the LHC PDF working group.
- Update with recent developments, e.g., jet multiplicity dependent uncertainties in the WW channel.
- Interference between resonant and non-resonant WW production not yet included.
- Higgs searches at the Tevatron have relied heavily on advances in theoretical calculations and in Monte Carlo modeling.

4th Generation Model

Exclude $124 < M_H < 286$ GeV



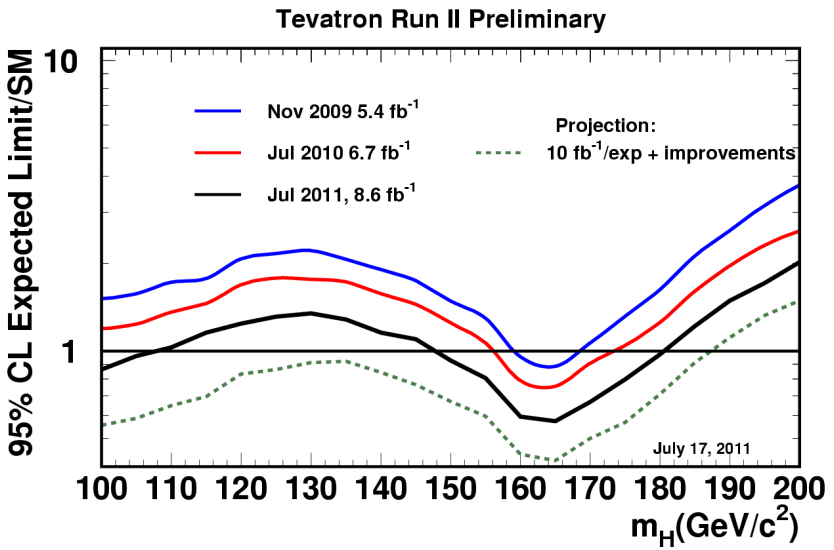
Gluon fusion cross section enhanced by up to a factor 9.

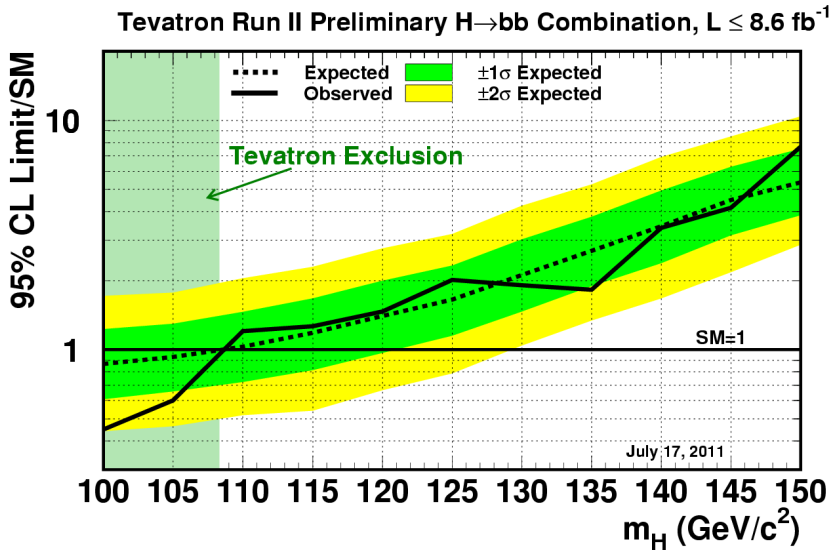
The Future


The Story of Pixar Animation Studios
To Infinity and Beyond!

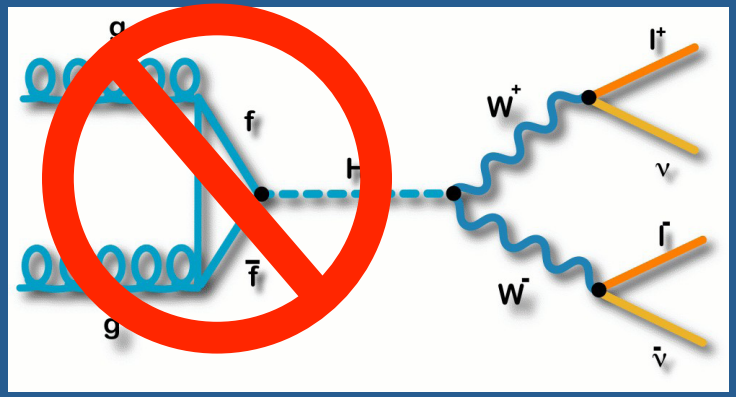
SM Higgs Search Projections

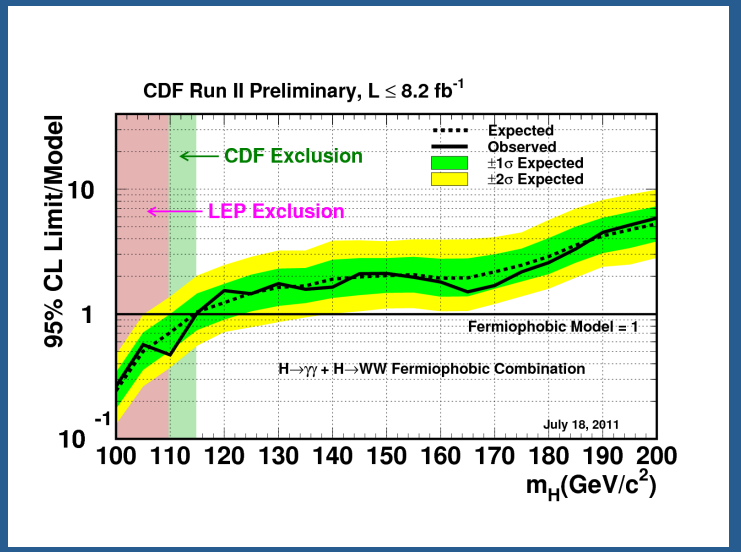
- Data taking will end on September 30, each experiment will have about 10 fb-1 to analyse, compared to about 8 fb-1 used for current results.
- Including analysis improvements, Tevatron will have sensitivity over entire allowed SM Higgs mass range.
- Tevatron remains unique in its sensitivity to Higgs to bb decays.





Fermiophobic Higgs



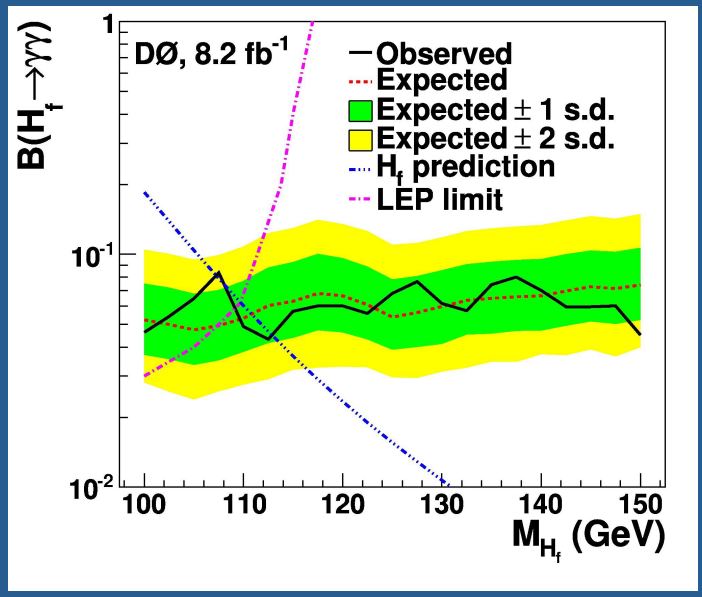


Fermiophobic Higgs not produced in gluon fusion process.

CDF uses H to γγ, WW to exclude M_H<114.8 GeV.

DØ uses H to γγ only to exclude M_H<112.9 GeV.

Tevatron combination imminent.

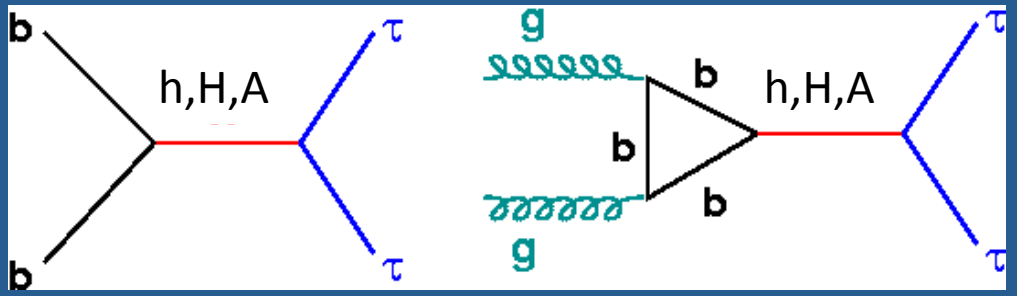


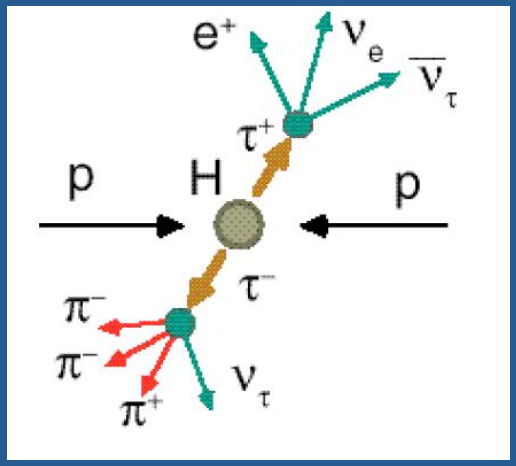
Supersymmetric Higgs (ττ)

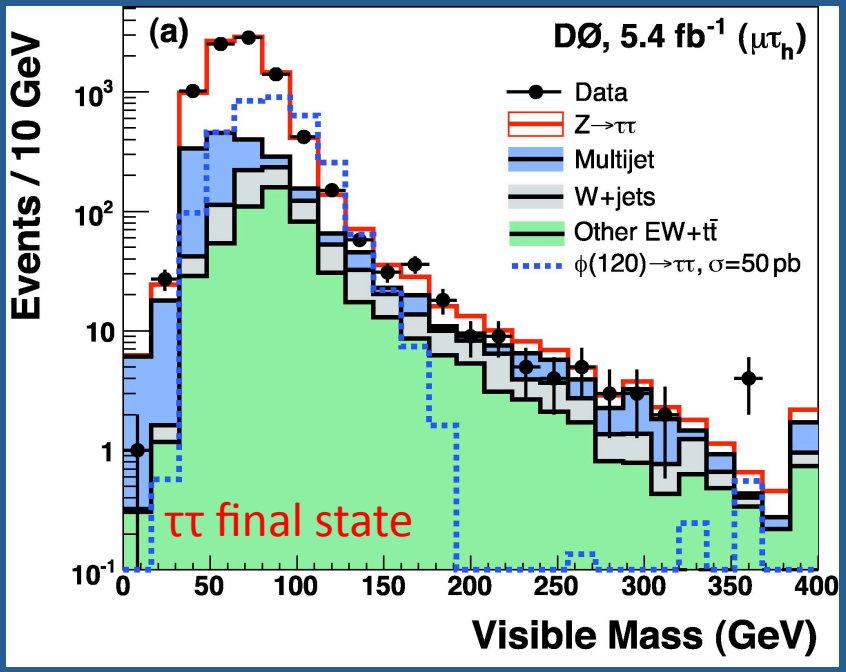
In the MSSM:

- two neutral CP-even Higgs (h,H)
- one neutral CP-odd Higgs (A)
- two charged ($H^{\pm}$)
  (not covered in this talk)

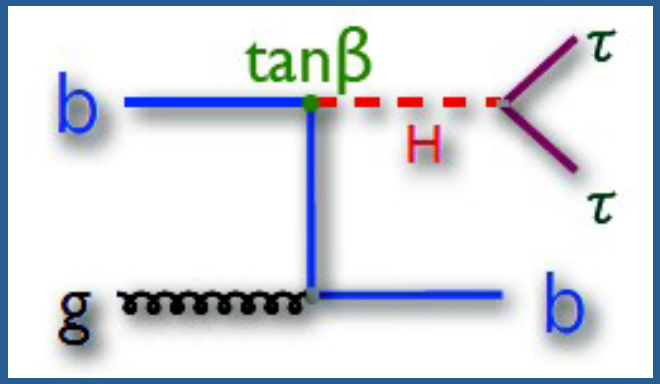
- h should be light (<135 GeV)
- H,A nearly mass degenerate
- H,A decays: ~10% to ττ, ~90% to bb

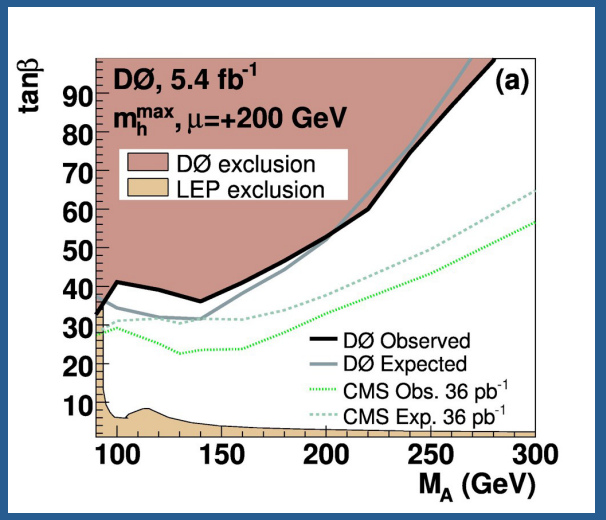




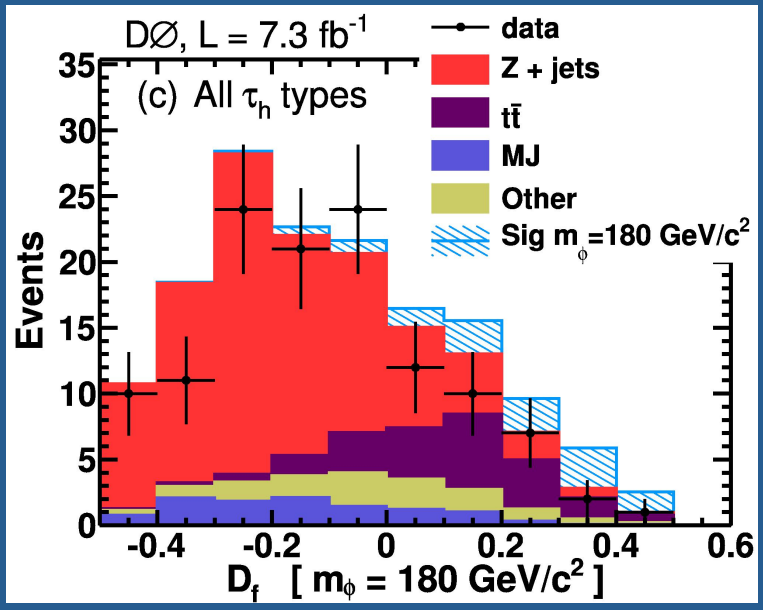


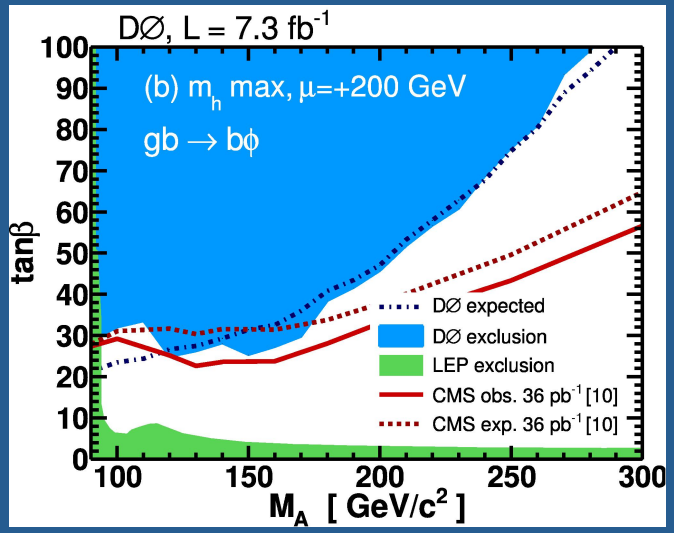
Supersymmetric Higgs (bττ)





ττ



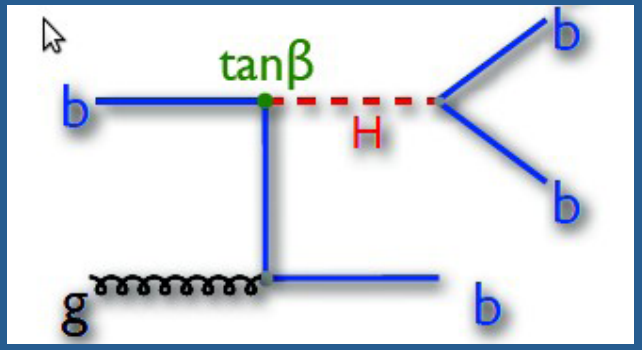


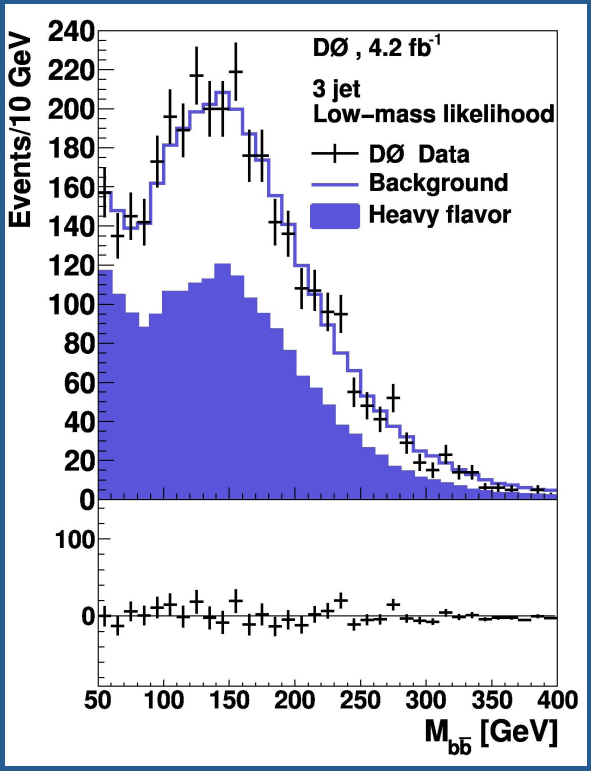
bττ

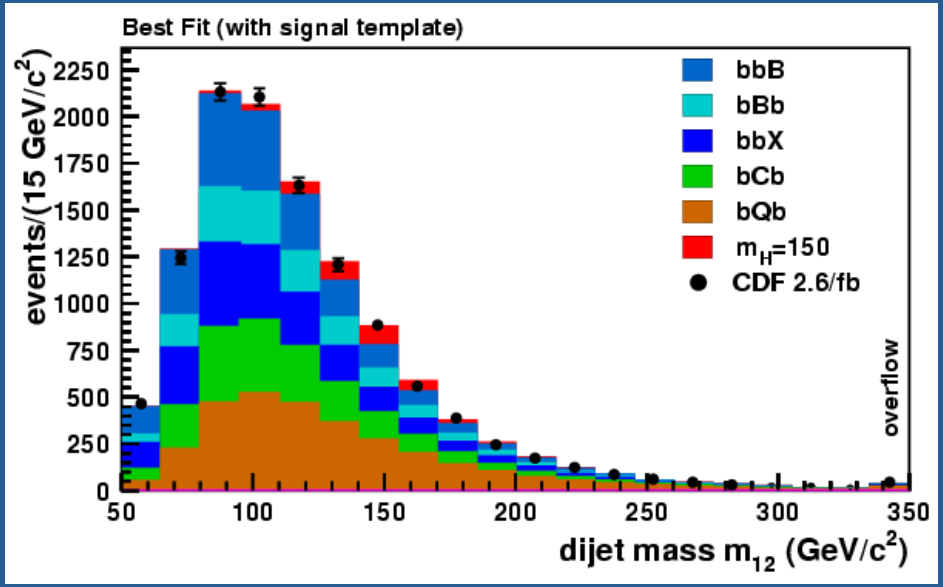
Competitive with LHC at low masses

Supersymmetric Higgs (bbb)

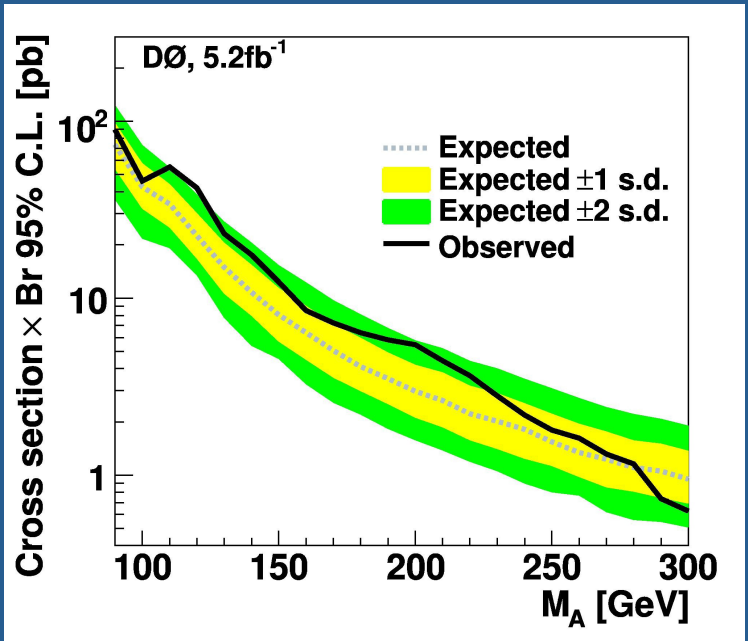
- fully hadronic final state, very challenging.
- data driven background model.
- template fits to determine normalisation.

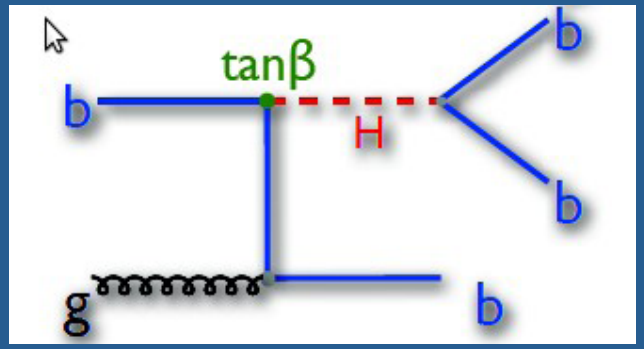


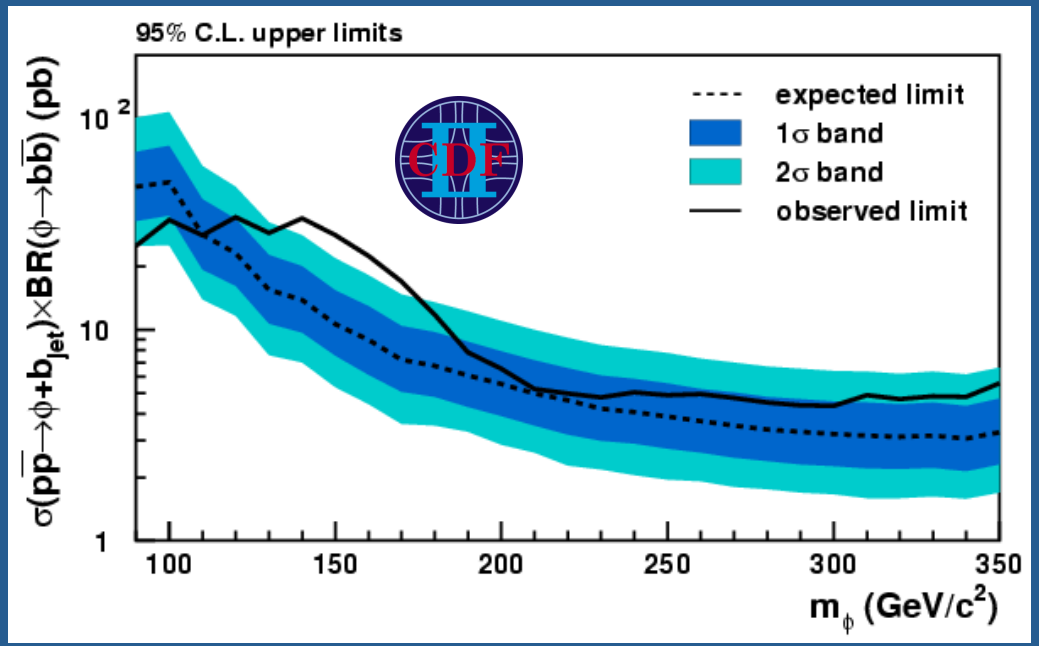




Supersymmetric Higgs (bbb)



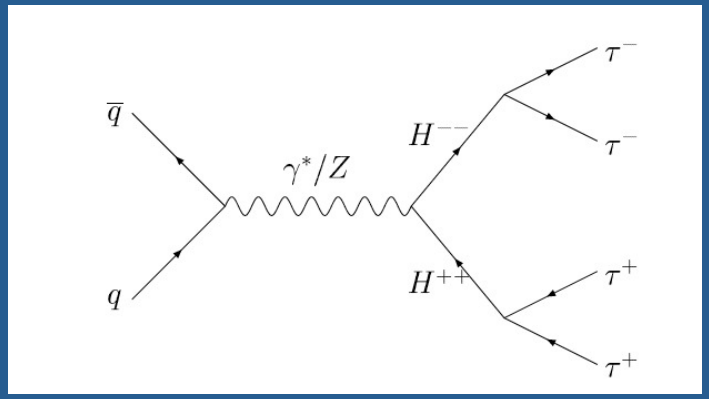


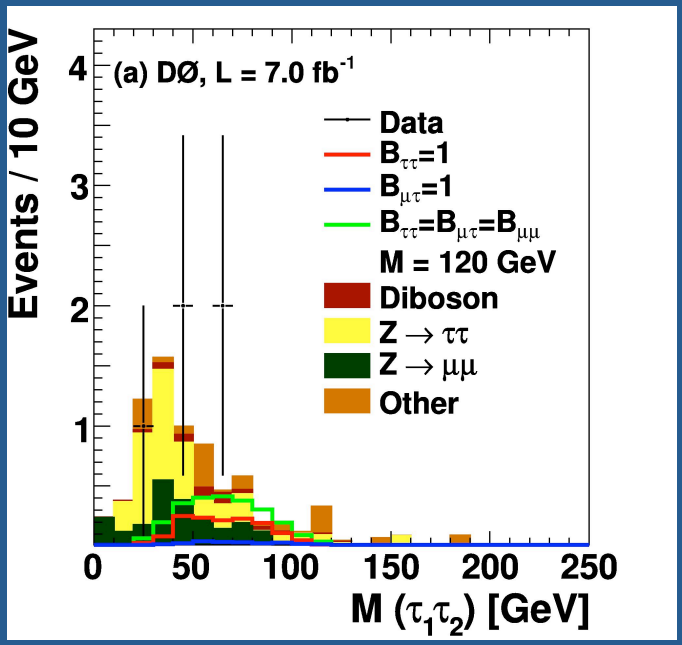


- small excesses at 120-150 GeV
- updates and combinations in progress

Doubly Charged Higgs Boson

- LR symmetric models, Little Higgs models..
- Assumed to decay to lepton pairs (LFV).
- Previous Tevatron limits on μμ, ee, eμ, eτ, μτ





Decay	$H_L^{\pm\pm}$	
	expected	observed
$\mathcal{B}(H^{\pm\pm} \to \tau^\pm\tau^\pm) = 1$	116	128
$\mathcal{B}(H^{\pm\pm} \to \mu^\pm\tau^\pm) = 1$	149	144
Equal $\mathcal{B}$ into $\tau^\pm\tau^\pm, \mu^\pm\mu^\pm, \tau^\pm\mu^\pm$	130	138
$\mathcal{B}(H^{\pm\pm} \to \mu^\pm\mu^\pm) = 1$	180	168

First limits on ττ final states at a hadron collider

Conclusions

- Tevatron allowed range $109 < M_H < 156$ GeV.
- Tevatron is currently unique – and complementary to the LHC - in having access to the bb decay mode.
- Sensitivity expected in all of the allowed mass range with final dataset.
- Competitive results in BSM Higgs searches.