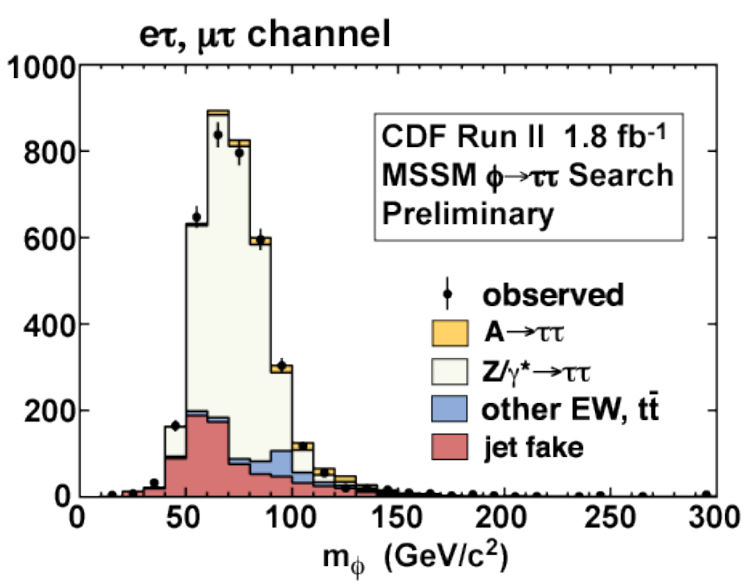
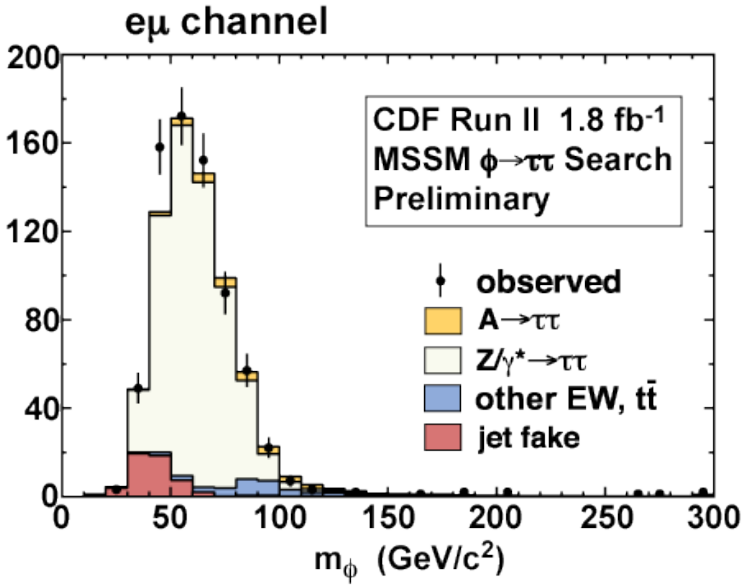
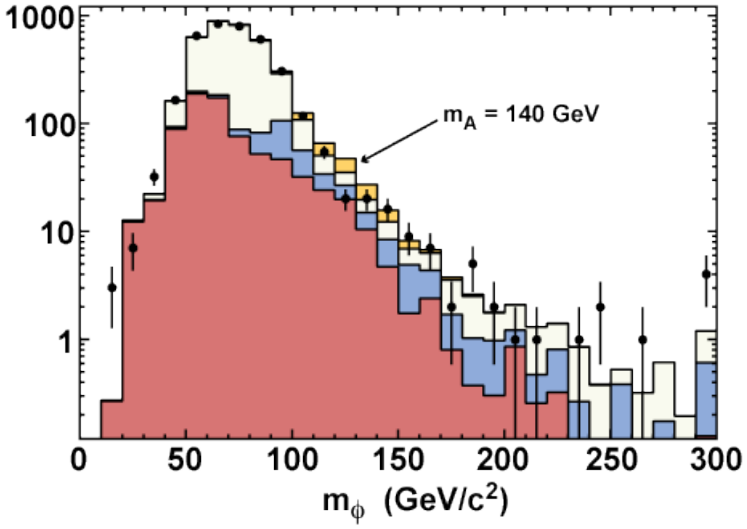
$h \rightarrow aa \rightarrow 4\tau$

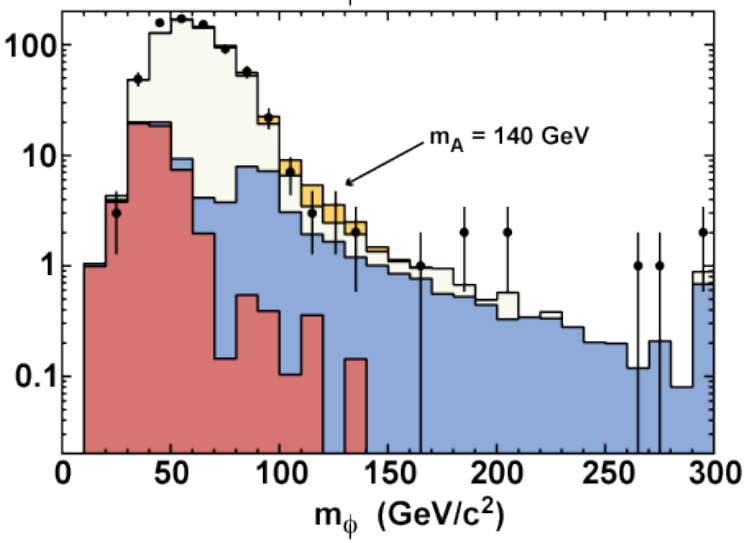
John Conway
UC Davis

Status of h/A/H→ττ

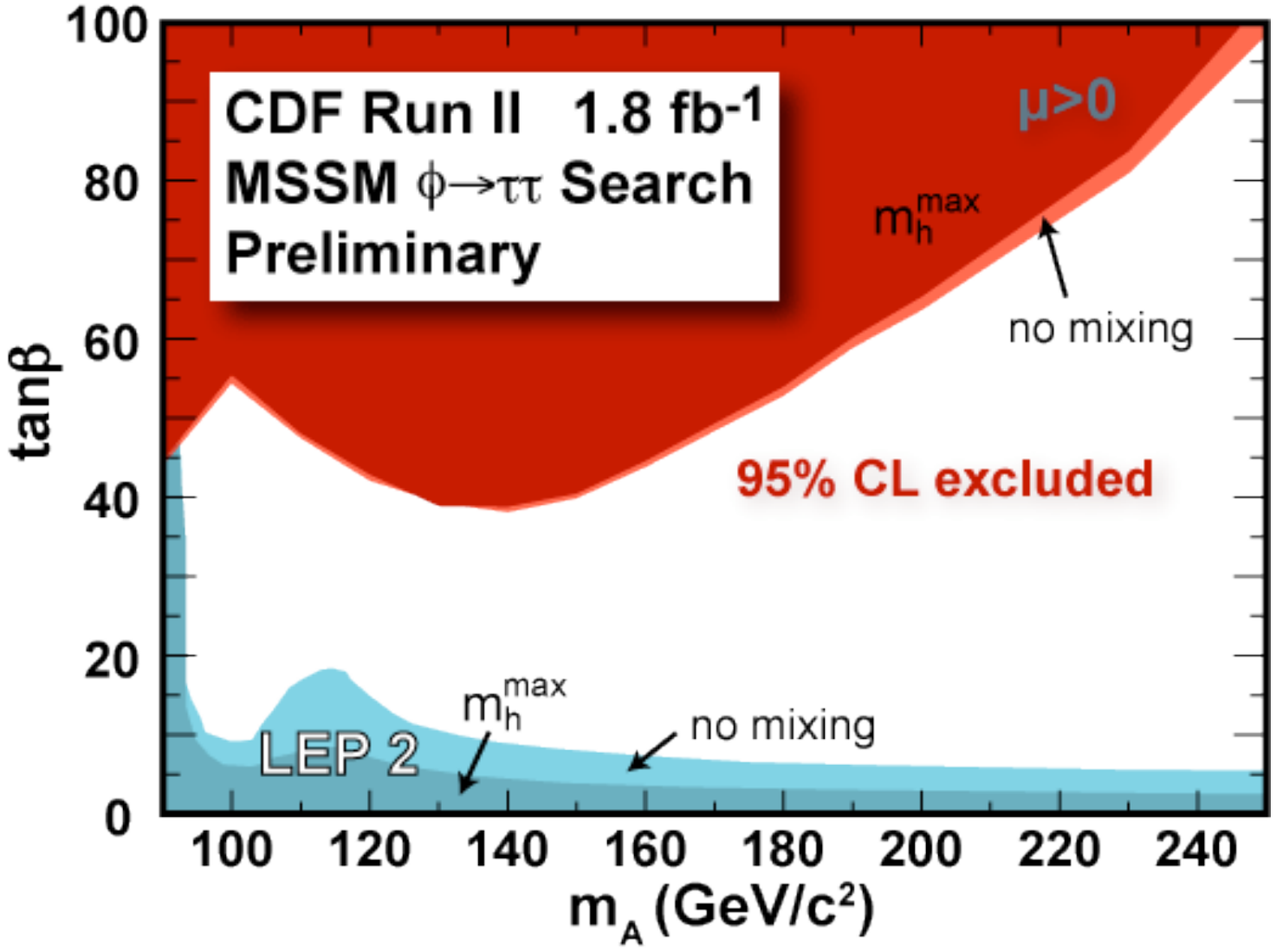




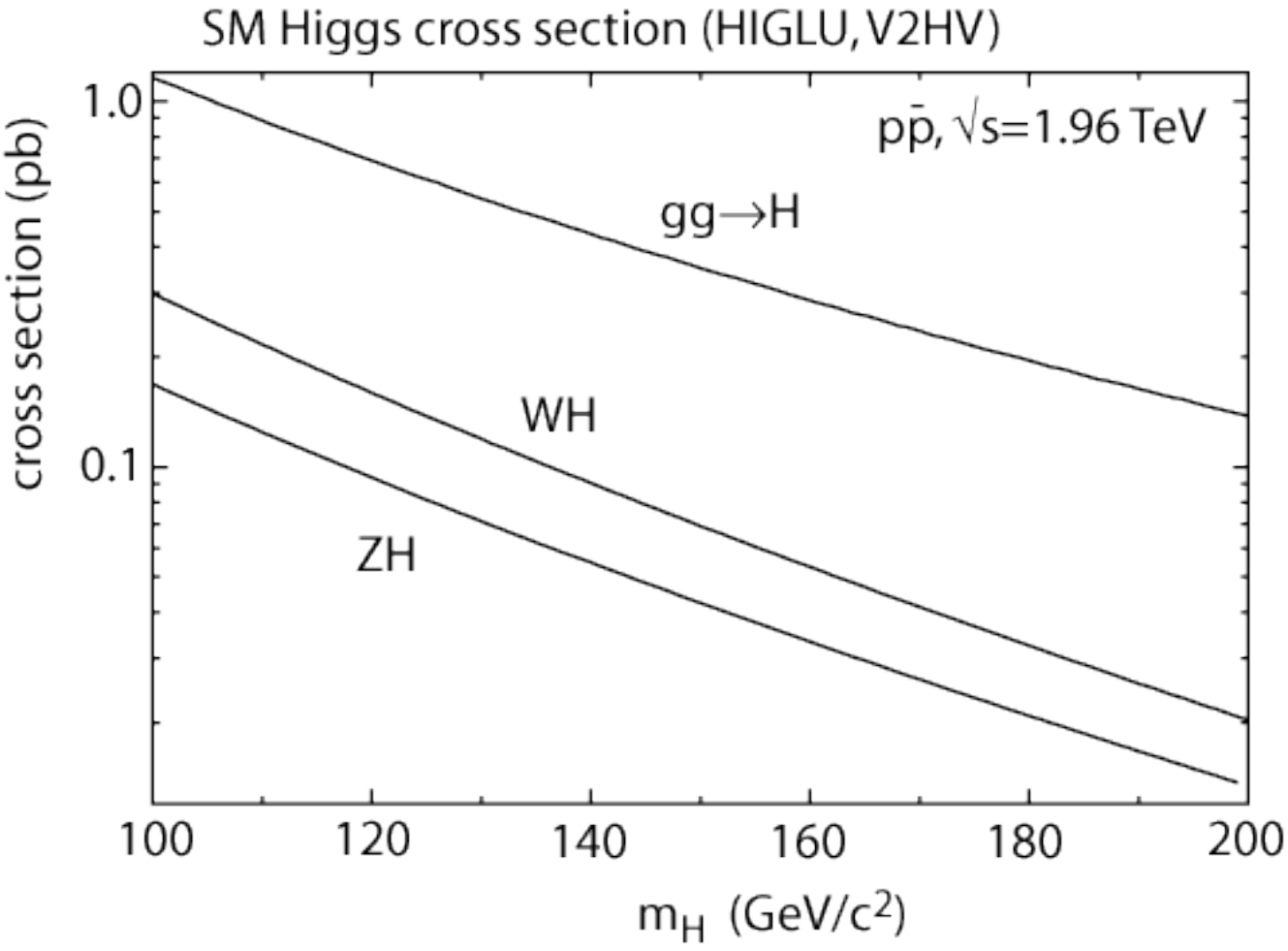




Status of h/A/H→ττ



Tevatron cross section



Assumptions

- produce h via $gg \rightarrow h$, $m(h) = 100$ GeV
- $h \rightarrow aa$, $m(a) \sim 10$ GeV
- $a \rightarrow \tau\tau$
- cross section: ~1 pb
- can accept events with four e/mu/tau above 10 GeV

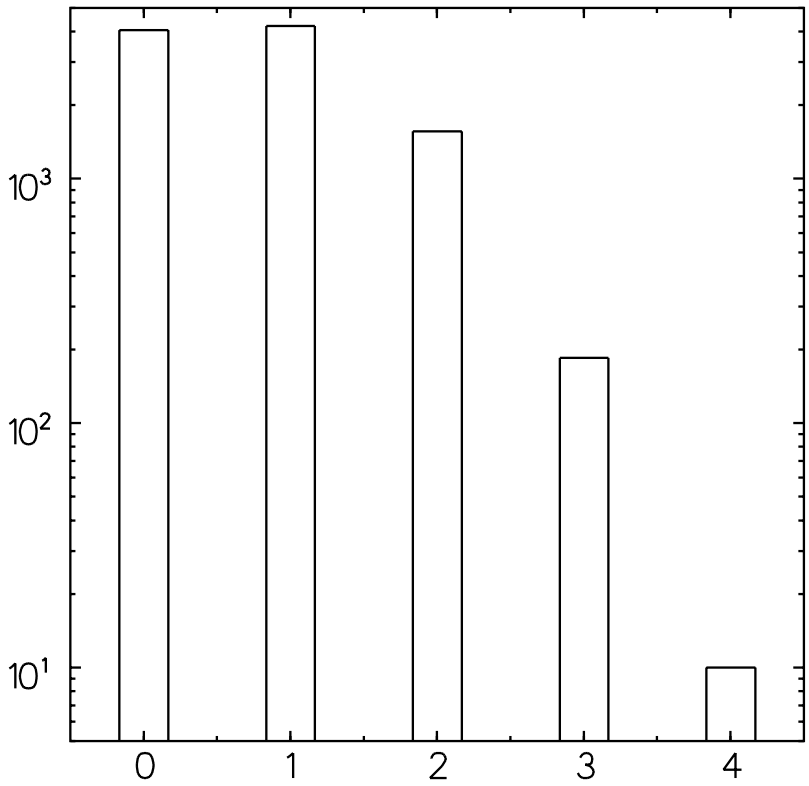
First attempts (PGS)

1. count e/mu/tau in all events (p_T > 10 GeV)

   result: acceptance ~ 10^{-3}

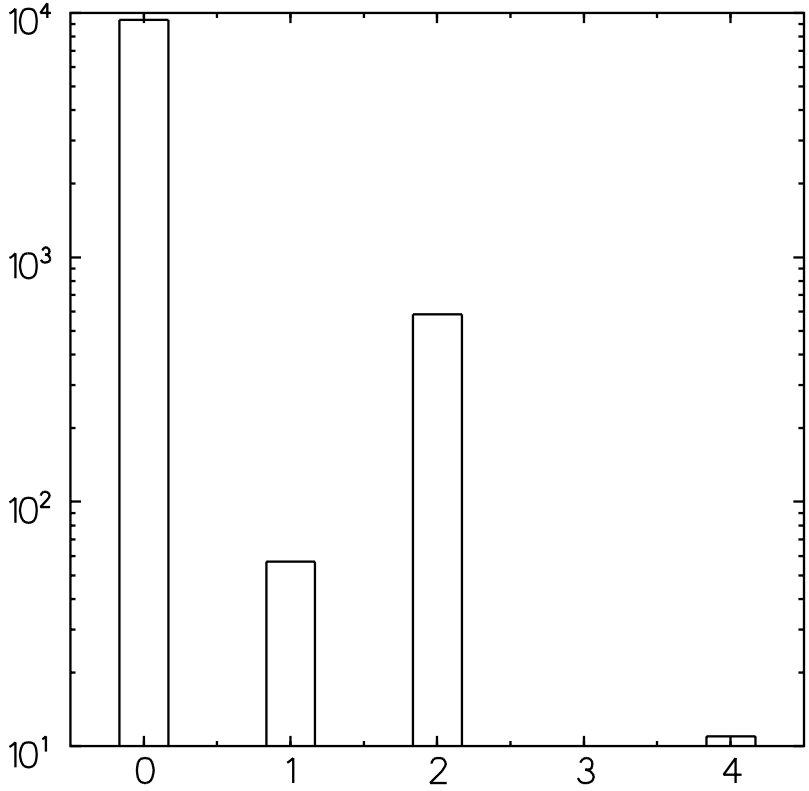
2. count track pairs (10-60 degree separation), p_T > 10 GeV

   result: acceptance ~ 6%



ID'd leptons/event

(p_T > 10 GeV)

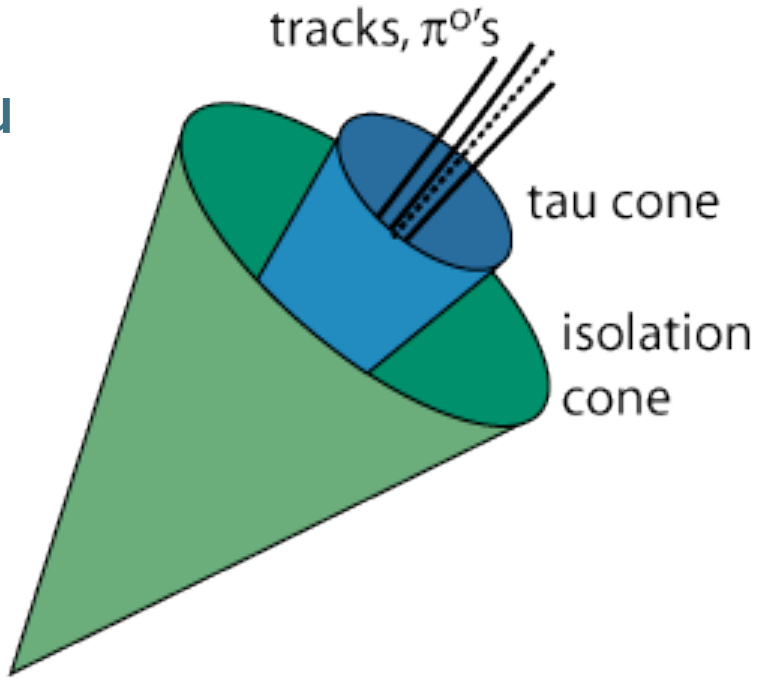


track pairs, 10-60°

(p_T > 10 GeV)

Tau ID

- use cone based algorithm
- select tracks, π^0's in tau cone
- demand none in 30° isolation annulus
- ~45% efficiency
- <1% jet fakes



Tau ID

- for this analysis, might allow one e or mu in isolation annulus
- must relax isolation on e/mu also
- will get larger contamination from jets

  $\Rightarrow$ use 1-prong taus only

- motivation for track counting study...
- track counting not enough: need to eliminate jets and/or other tracks

Track-only analysis?

- demand 4 tracks with pt > 10 GeV
  - demand no other tracks with p_T > 2 GeV

    result: acceptance ~ 4.0% (92 events!)
- what are the major backgrounds?
- do we need to lower p_T threshold?
- do we need to impose isolation in 10° cone to reduce dijet background?

Questions

- What is the result of the OPAL analysis?
- Does CDF's trigger cover this?
- What do CMS/ATLAS need to do? (Add 1 or more ID'd leptons: acceptance = 3%)