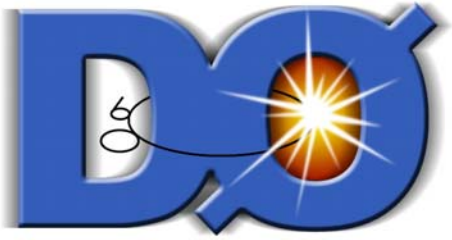
Searches



Tracey Berry
University of Liverpool

Motivation for Searches

The Standard Model (SM) leaves many open questions …

- What is the origin of mass?
- Are there 3 generations? And if so, why?
- Why is there such a large mass hierarchy?
  - Within fermion sector
  - Between EWK and Planck scale
- What is cold dark matter?
- Is there a common single force?
- Are the fermions and bosons point-like? Or do they have substructure?

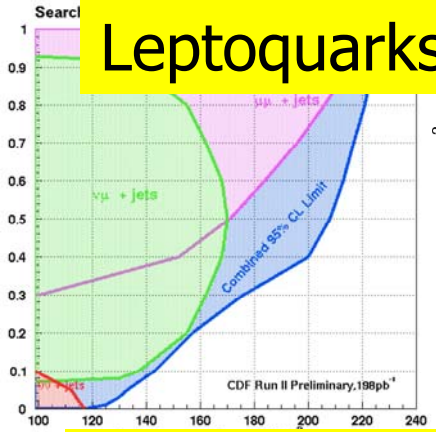
…and there are many models to address these!

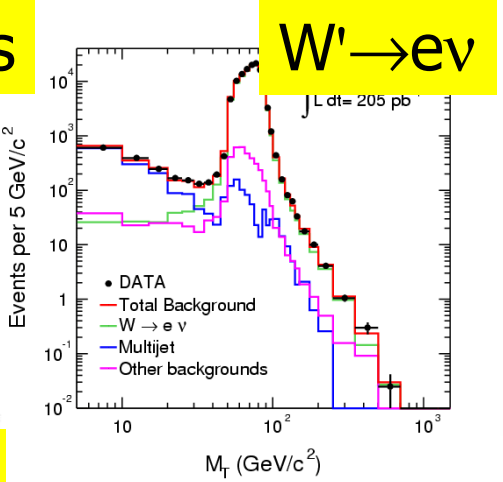
- Supersymmetry
  - mSUGRA, GMSB, AMSB, R-parity violated or not,…
- Extended gauge theories
- Little Higgs
- Technicolor, topcolor
- Compositeness: excited fermions
- Extra dimensions (ADD, Randall-Sundrum, TeV^{-1})
- …

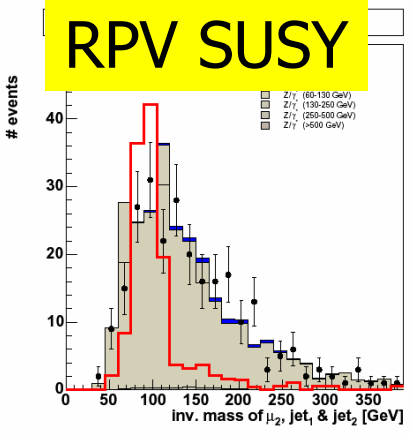
Most predict new particles to be discovered

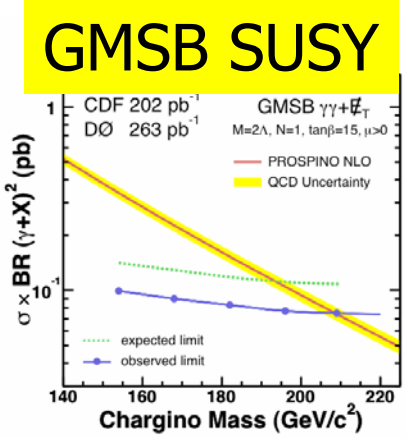
Or deviations to SM σ s/observables to be detected

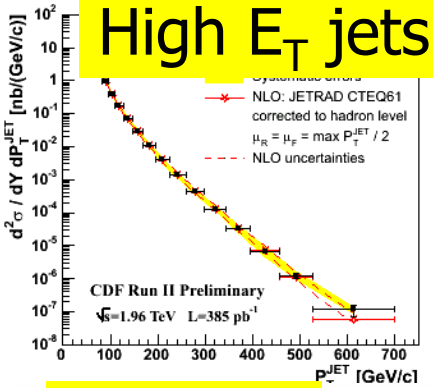
Lots of Run 2 Search Results....

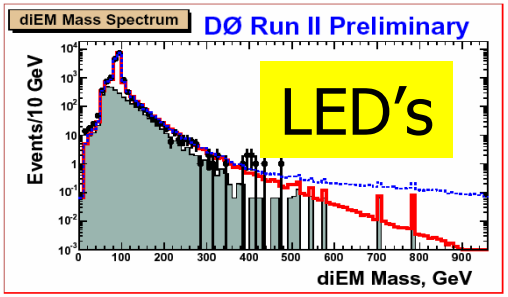


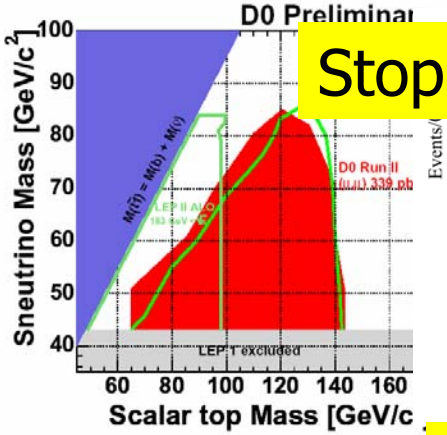


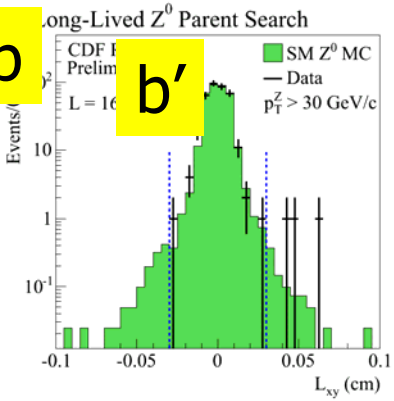


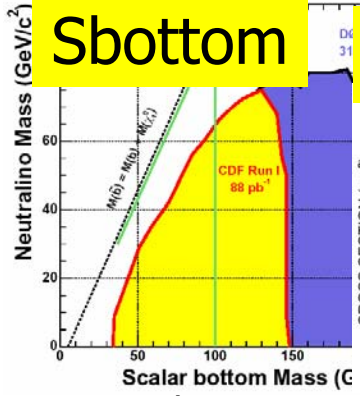


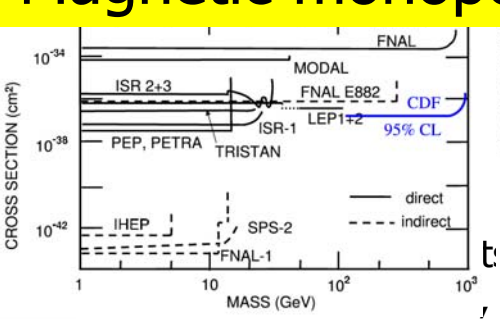


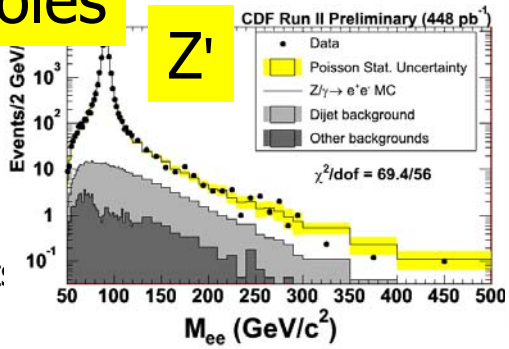


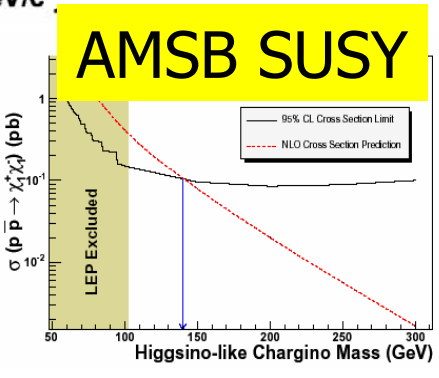












Few Selected Analyses

to highlight the variety searches/signatures/methods used

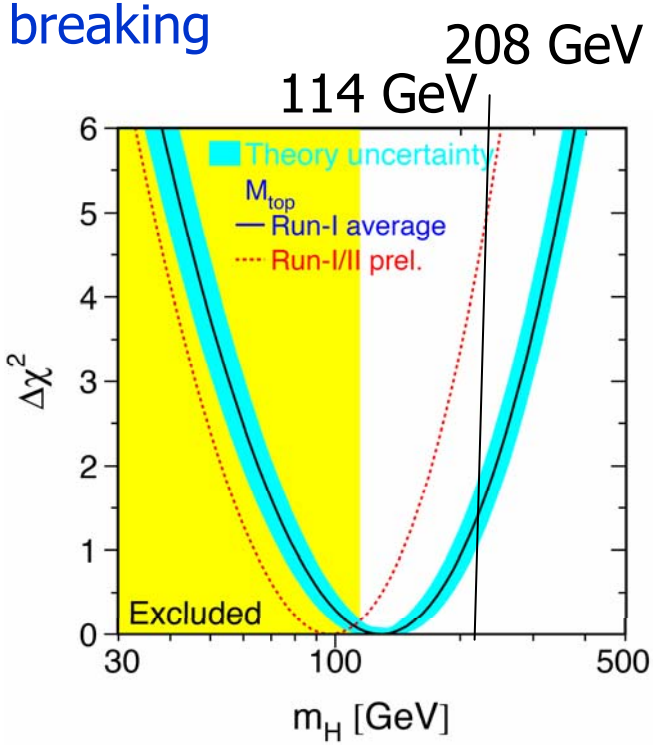
- Standard Model Higgs Boson
- SUSY:
  - Higgs Bosons
  - Charginos/Neutralinos + Squarks/Gluinos
  - Rare Decays
  - ChaMPs
- Extra Dimensions
- Z' Bosons

Analyses use ~ 300-600 pb^{-1}
data taken from September 2004 to March 2005

Standard Model Higgs Boson

Only Standard Model particle not see as yet:
understanding of electroweak symmetry breaking

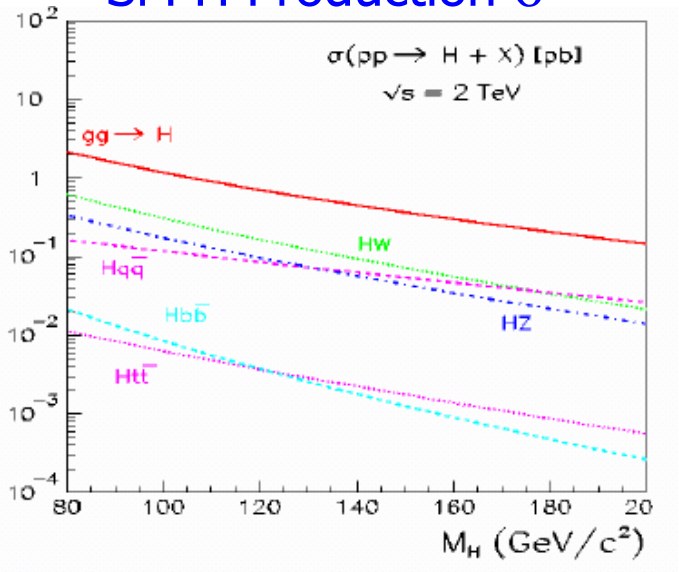
- Direct searches at LEP:
  $M_H > 114$ GeV (95% CL)
- Precision data prefer light SM Higgs
  precision EW fits:
  $M_H = 98$ GeV $\rightarrow$ $M_H < 208$ GeV (95% CL)
- SUSY (MSSM) requires $m_h < 136$ GeV/c^2



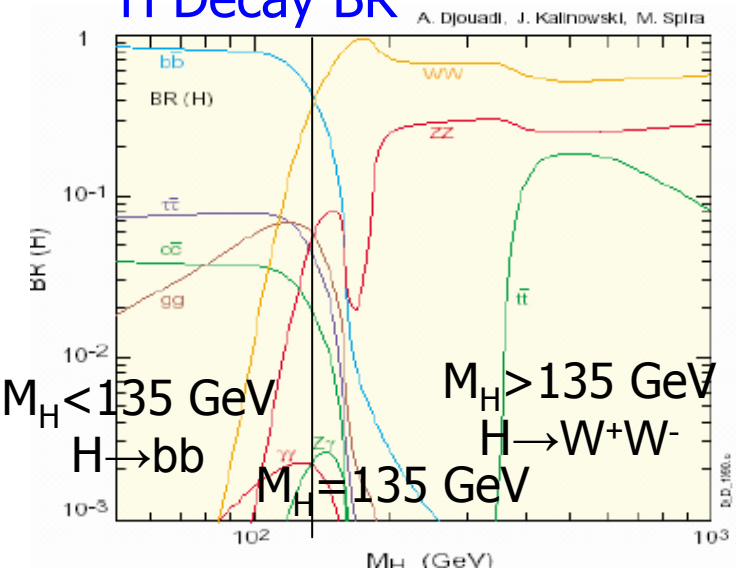
Tevatron: both direct searches & (M_W, M_{top}) precision measurements

SM Higgs Searches

SM H Production σ



H Decay BR



Low Mass SM Searches:

M_H < 135 GeV: H→bb

Gluon fusion production swamped by QCD background

Need to search for (W/Z)H production (using leptonic decays of W/Z)

-Dominant decay into bb (~90%)
-Search for peak in bb mass spectrum

High Mass SM Searches

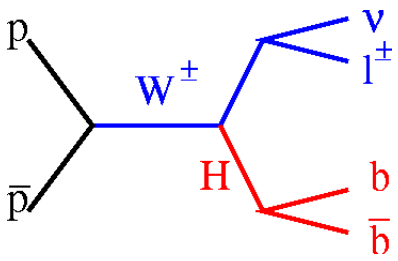
M_H>135 GeV: H→W^+W^-

Can search for both gluon fusion & (W/Z)H production

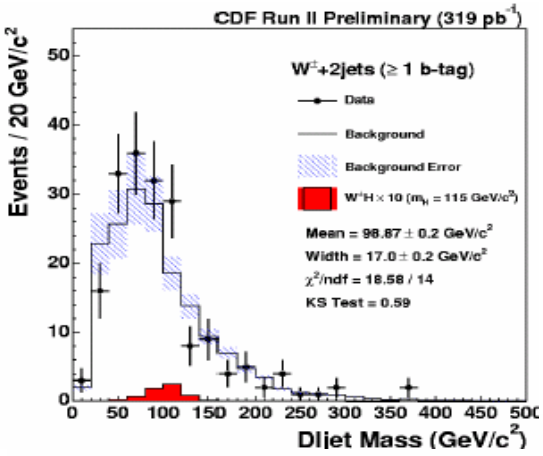
-Dominant decay into WW (~90%)
-Examine angular distributions of leptons

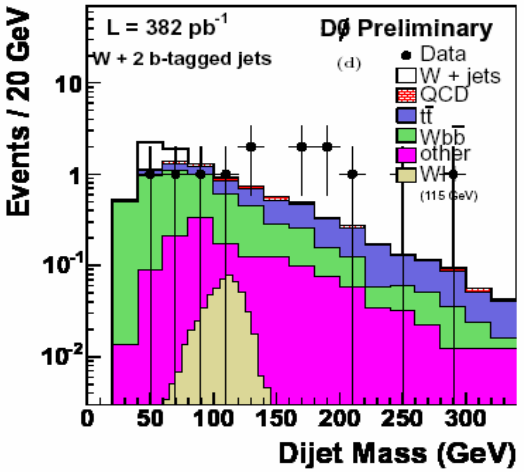
Low Mass: WH→(e/μ)νbb

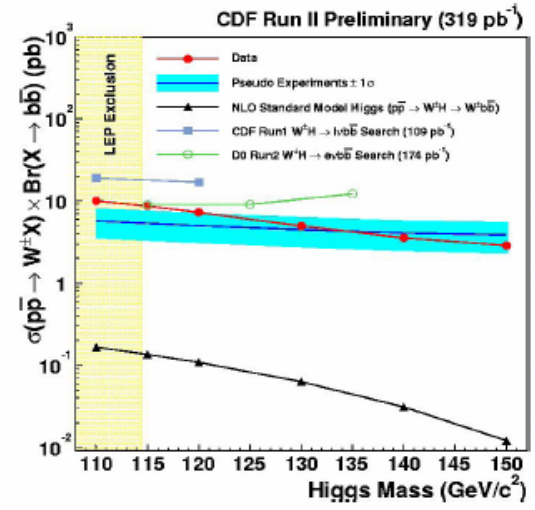
CDF (319pb^{-1}) & D0 (382pb^{-1}) have performed 1 & 2 b-tag searches

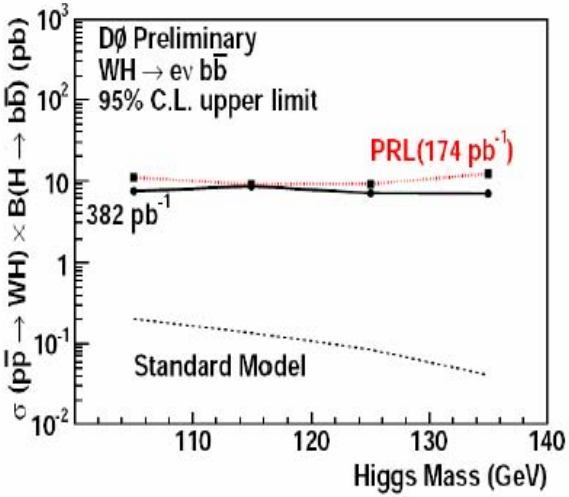


No peak in bb mass spectrum observed

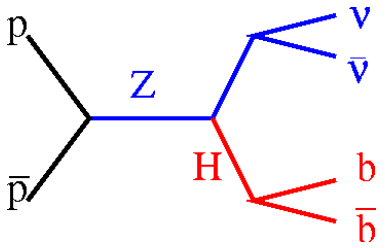




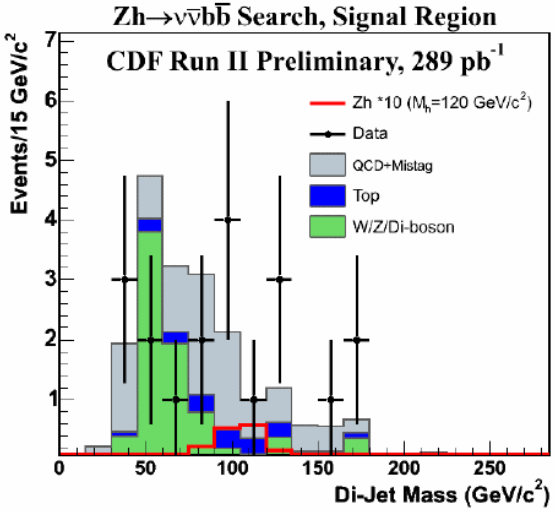


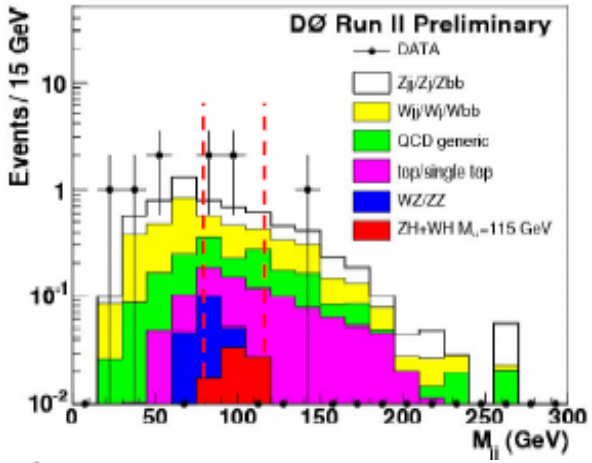


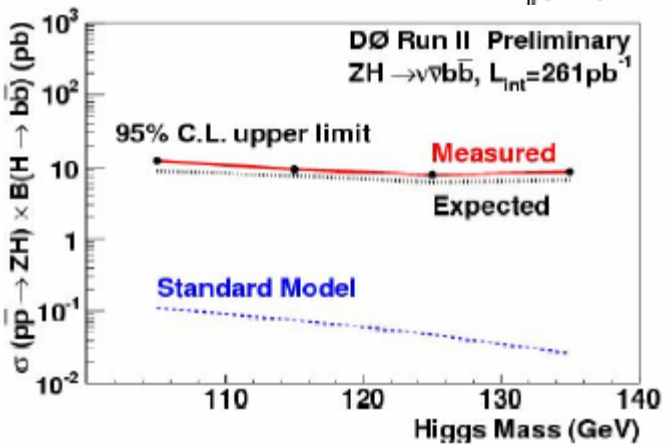
Low Mass: ZH→νν̄bb



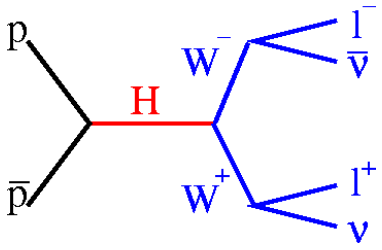
Search for excess in the di-b-jet mass distribution







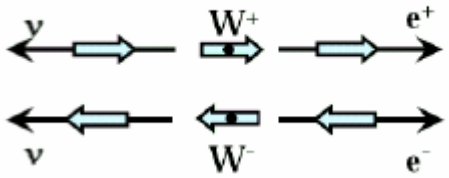
High Mass: gg→H→WW

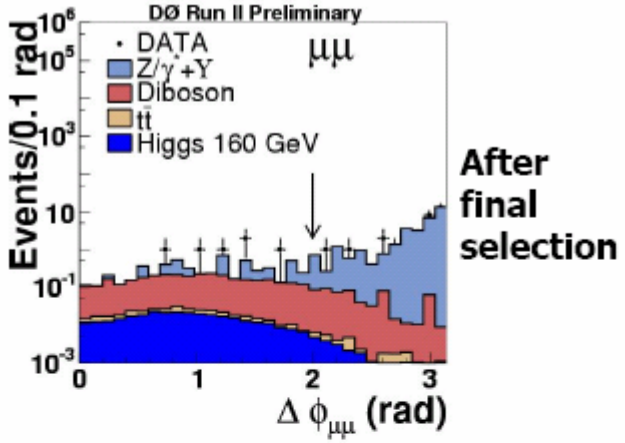


High mass, m_H>135 GeV/c^2:
-Can search for both gluon fusion & (W/Z)H production
-Dominant decay into WW (~90%)
-Examine angular distributions of leptons

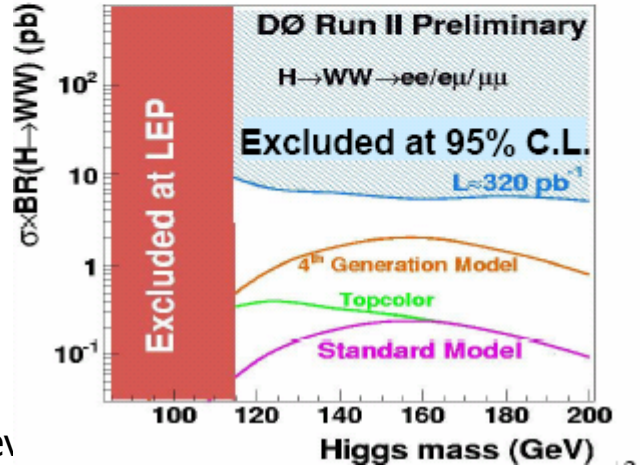
Search Selection D0 299-325 pb^{-1}
Dilepton data: ee, eμ, μμ with p_T>15/10 GeV
Opposite charge
Missing E_T>20 GeV

- **Additional kinematic cuts (e.g., m^{ll}, m_T^{ll}, H_T, etc.)**
- **Exploit spin correlations in decay (leptons from H tend to point in the same direction)**
  - **$\Delta\phi_{ll} < 2$**





After final selection



High Mass: WH→WWW(*)

Search Selection

D0 384-363pb^{-1}

ee, eμ, μμ

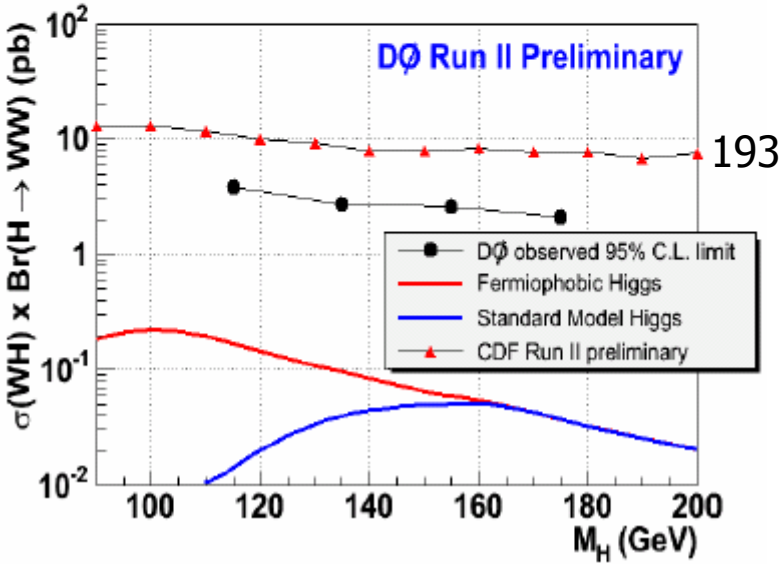
-2 like-sign isolated leptons

-P_T>15 GeV, veto 3rd lepton

-Track quality cuts

-Missing E_T>20 GeV

	ee	eμ	μμ
Observed data	1	3	2
Total bkgd	0.70	4.32	3.72

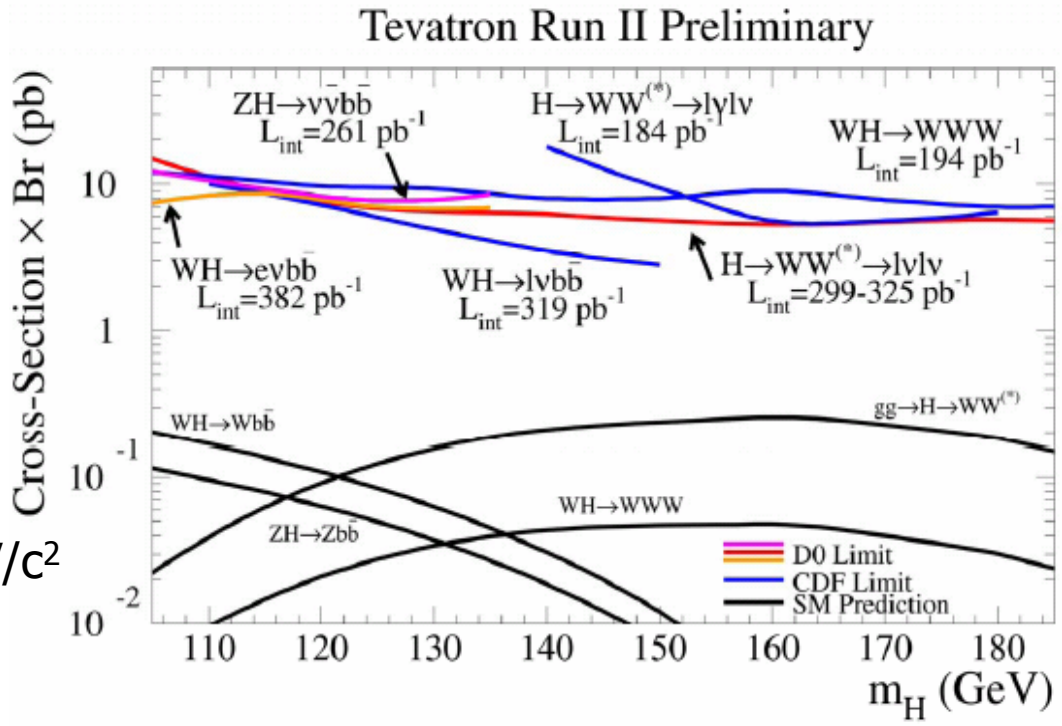


193.5 pb^{-1}

Current Higgs Search Summary

- Current results from DØ and CDF:
  - WH->lνbb
  - ZH->ννbb
  - WW->llνν
  - WWW->$l^{\pm}l^{\pm}$ + X
- SM predictions much lower than current analyses:

e.g Combination of current CDF analyses (L=300 pb^{-1}) gives upper limit 20 times larger than SM prediction at 115 GeV/c^2



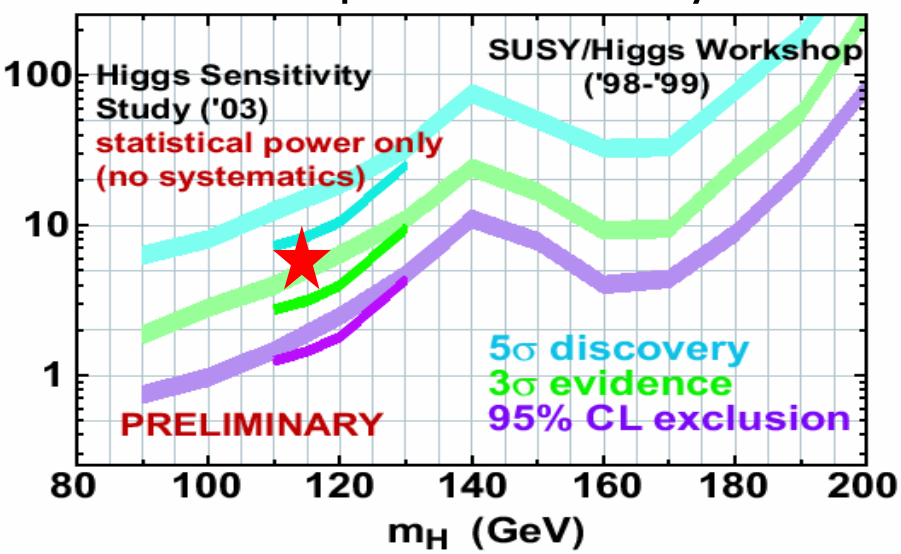
Can we close the gap?

- ➢ Will gain factor √2 from combination of CDF and D0
- ➢ Factor √(L/300 pb^{-1}) with increasing luminosity
  - Factor 5 missing with L=2 fb^{-1}

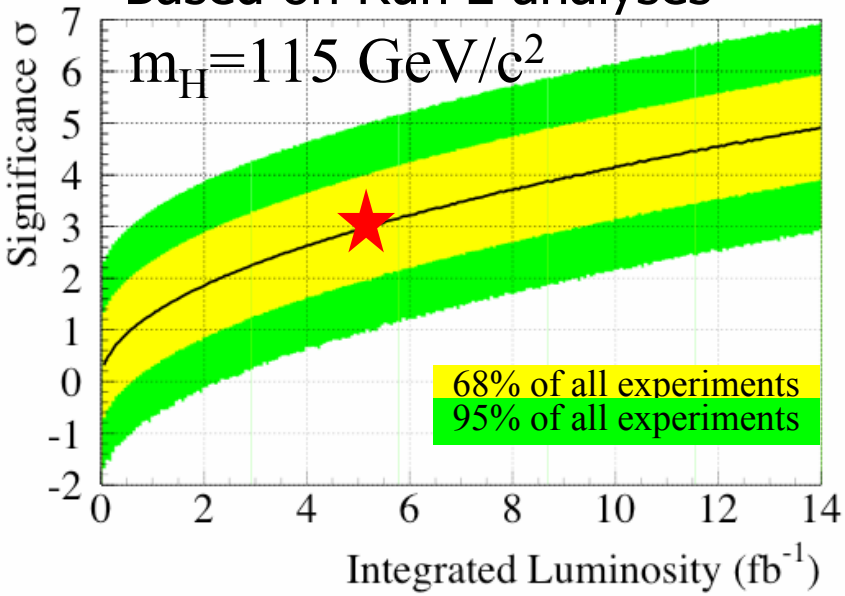
Expect factor ~10 improvements in analyses and CDF+DØ combination:
=> Need 2.5 fb^{-1} for 95% C.L. exclusion of 115 GeV Higgs

Higgs at Tevatron: Conclusions

Based on pre-Run 2 analyses



Based on Run 2 analyses



- Confirmed previous studies with Run 2 data experience
  - Syst. uncertainties increase required luminosity by 40%
- 95% C.L. exclusion:
  - $\int Ldt$ =2-2.5 fb^{-1}: probe LEP excess at m_H=115 GeV/c^2
  - $\int Ldt$ =4.0 fb^{-1}: up to m_H=130 GeV/c^2
  - $\int Ldt$ =8.0 fb^{-1}: up to m_H=135 GeV/c^2
- 3σ evidence:
  - $\int Ldt$ ≈5.0 fb^{-1}: for m_H=115 GeV/c^2

Supersymmetry

- Addresses many questions and problems in SM:
  - Elegant solution to hierarchy problem ($m_W << m_{Pl}$)
  - Achieves unification of gauge theories at GUT scale
  - Predicts a natural candidate for cold dark matter
    - if R-parity is conserved
- More than 100 parameters:
  - Rich phenomenology => many different signatures
- Experimental status:
  - No evidence found:
    - Stringent direct limits on sleptons and gauginos set by LEP: e.g. $m(\chi^{\pm}) > 103.5$ GeV/c^2
  - Consistent with measurements of $\Omega_{DM}h^2$, $(g-2)_\mu$, $b \rightarrow s\gamma$ and electroweak precision data

H in Minimal Supersymmetric SM

Supersymmetry (MSSM)

EWSB via vacuum expectation values of 2 Higgs doublets, resulting in 5 physical Higgs bosons: h, H, A, $H^{\pm}$

Two free parameters: M_A and $\tan\beta=v_2/v_1$

h/H/A Production at TeVatron

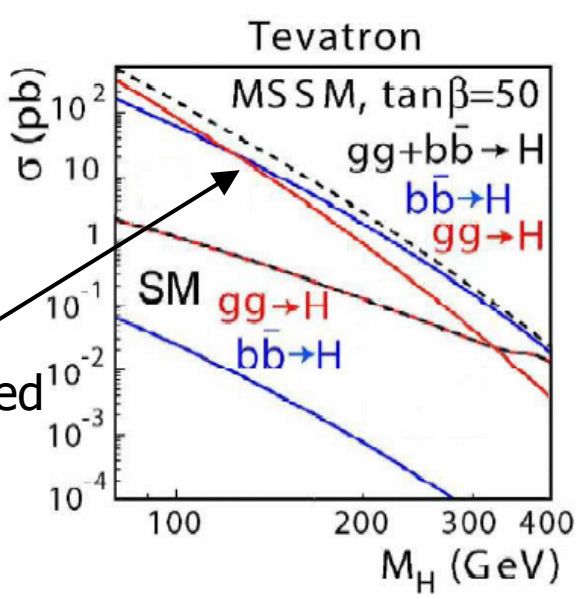
At small $\tan\beta$ or high M_A or large $\tan\beta$ & small M_A:
h or H couplings to W/Z similar to SM

$\Rightarrow$ search for (W/Z)h or (W/Z)H

At large $\tan\beta$: A degenerate in mass with h or H

– Cross sections enhanced with $\tan 2\beta$ due to enhanced (h/A) or (H/A) couplings to down-type fermions

$\Rightarrow$ complimentary search for bb(h/A) or bb(H/A)



h/H/A Decays

In most of parameter space:

h/H $\rightarrow$bb (90%)

$\rightarrow\tau^+\tau^-$ (10%)

$\rightarrow$ WW/ZZ suppressed, except for small $\tan\beta$ and M_H>160 GeV

In all parameter space:

A $\rightarrow$bb (~90%)

$\rightarrow\tau^+\tau^-$ (~10%)

Exact values depend on SUSY parameter space

MSSM Higgs:bbϕ->bbbb, ϕ=h/A or H/A

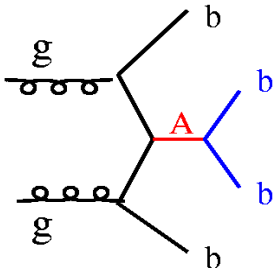
Large tanβ

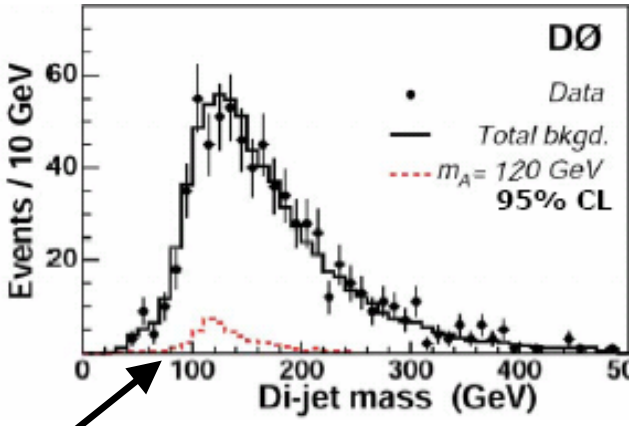
Signature:

Complimentary search:

bb(h/A) or bb(H/A)

ϕ->bb

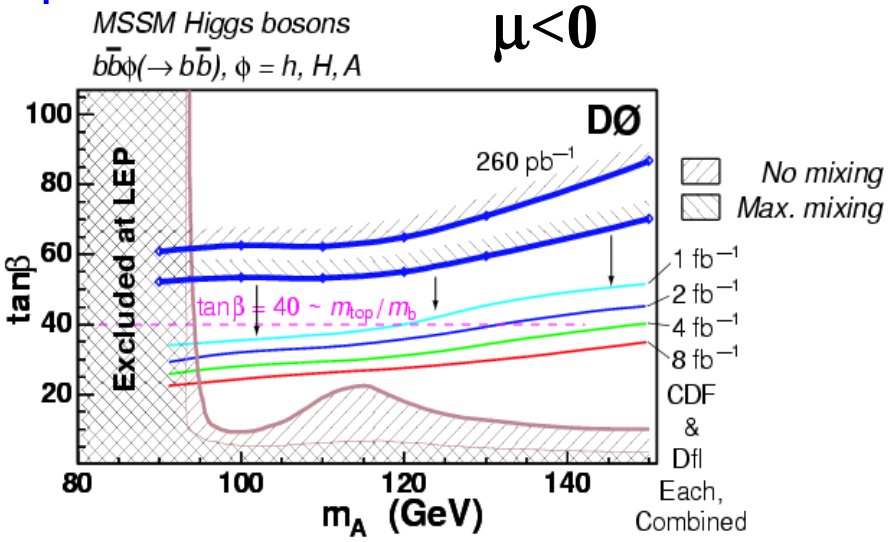




Selection: at least 3 b-tagged jets

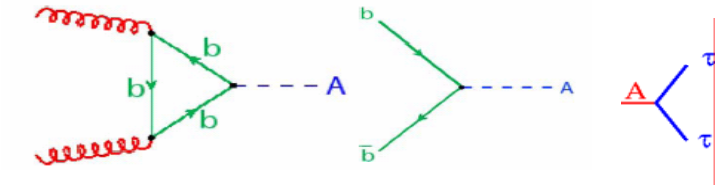
Reconstruct Higgs boson mass in bb spectrum

No hint of signal in 260pb^{-1}



MSSM Higgs: h/H/A→ττ

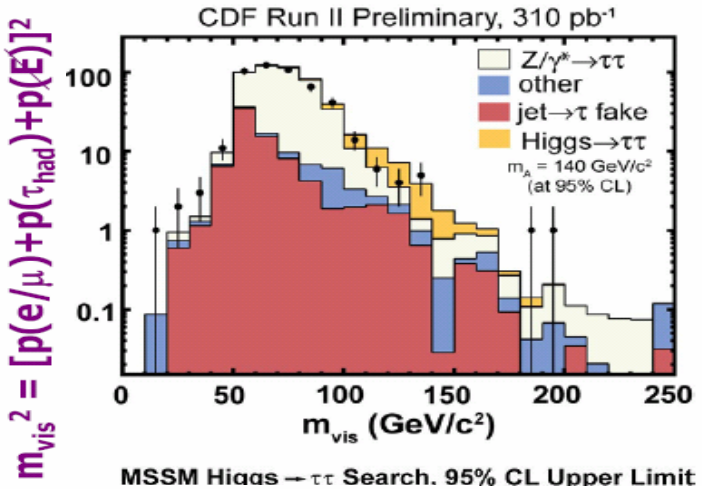
Large tanβ



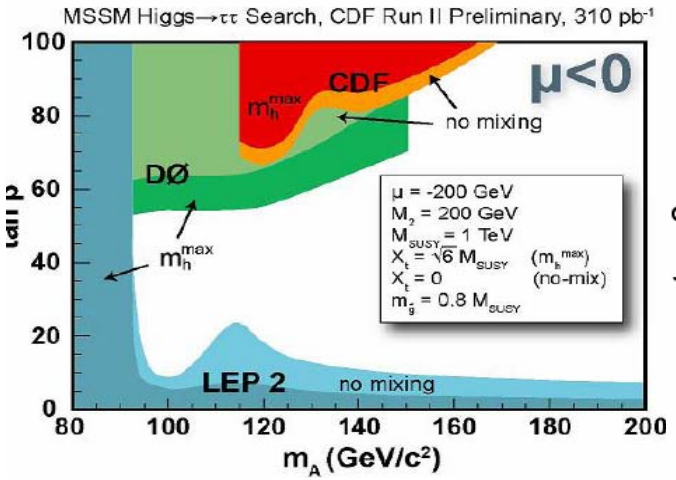
Selection 310pb-1

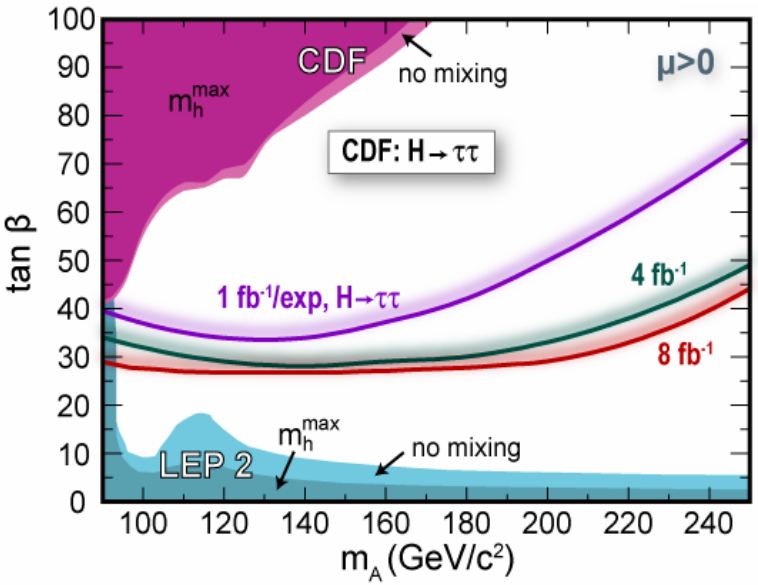
e/μ w/p_T>10 GeV
τ_{had} w/p_T>15 GeV
} opposite charge

$p_T(e/\mu)+p_T(\tau_{had})+ME_T$>50 GeV
Anti-W cut



Interpret σ limit in terms of tanβ and m_A:





Complementary to SUSY Higgs bbb(b) mode

Other Higgs analyses.....

$ZH \rightarrow l^+l^-bb$

Charged Higgs

H++, H—

$H \rightarrow \gamma\gamma$

.....

SUSY Trileptons

"Golden" trilepton chargino-neutralino production

$$\tilde{\chi}_2^0 \tilde{\chi}_1^\pm \rightarrow l^\pm l^\mp l^\pm \tilde{\chi}_1^0 \tilde{\chi}_1^0 X$$

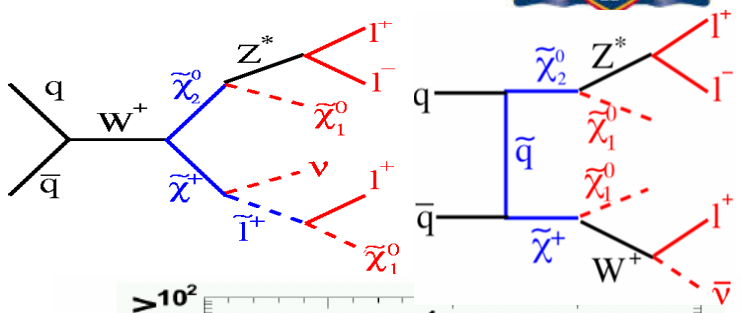
Low SM backgrounds

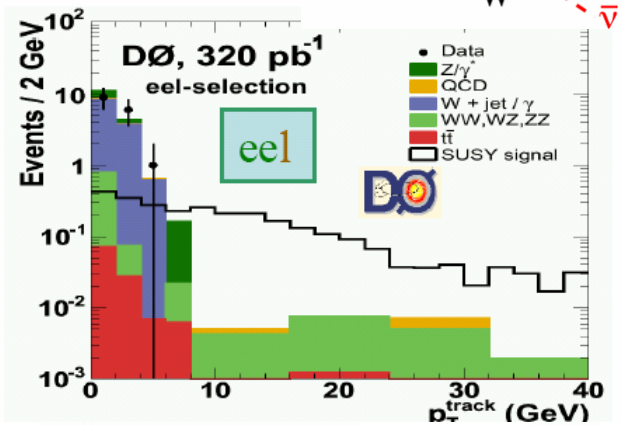
Signature

3 (low p_T) leptons + large ME_T

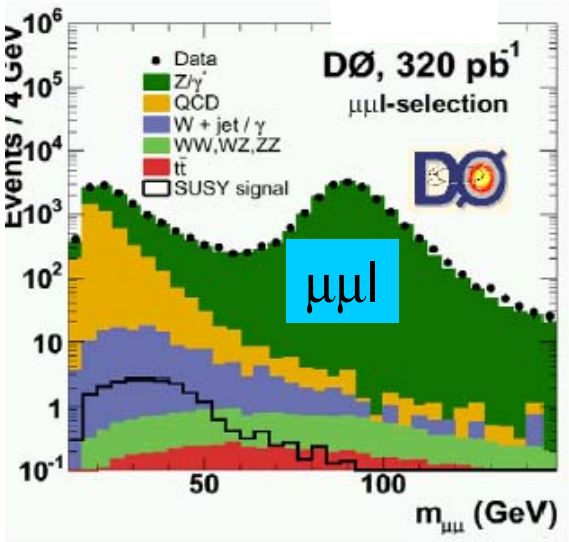
Selection DØ 320 pb^{-1}

- 2 l (l=e,μ,τ) + isolated track or $\mu^\pm\mu^\pm$
- ME_T + topological cuts
- Analysis most sensitive at low tanβ





Channel	Observed	SM expected
e e + *l*	0	0.21±0.12
e μ + *l*	0	0.31±0.13
μ μ + *l*	2	1.75±0.57
Same sign μ μ	1	0.66±0.37
Sum	3	2.93±0.54±57
e τ + *l*	0	0.58±0.14
μ τ + *l*	1	0.36±0.13



Trilepton Limits

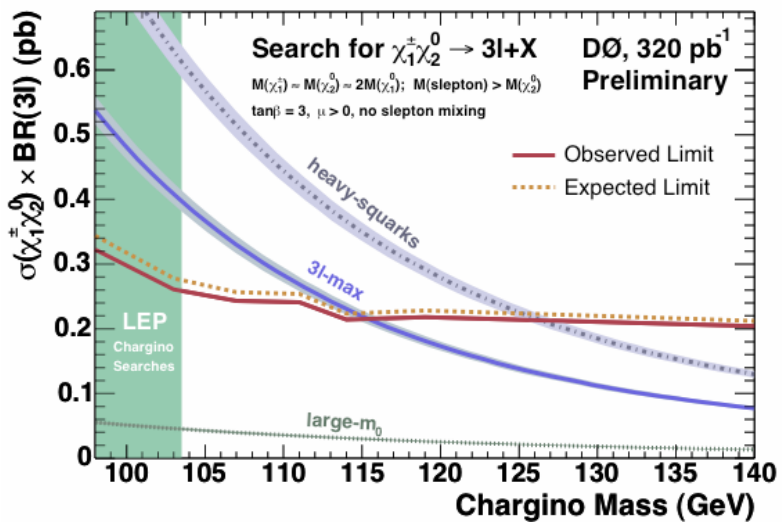
Results σxBR<0.2-0.3 pb

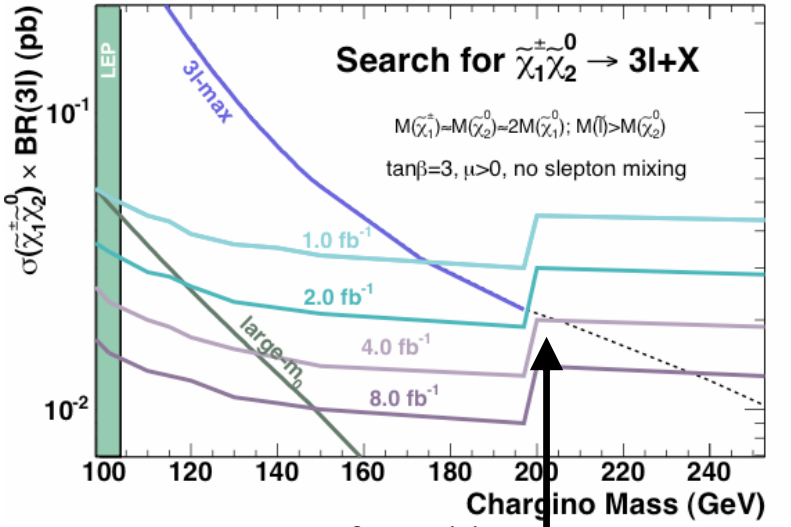
- 3l-max: low m0 - leptonic BR is maximally enhanced for $M(\tilde{l}) \geq M(\tilde{\chi}_2^0)$

  $M(\tilde{\chi}_1^\pm) > 117\ GeV$

- heavy-Squarks: $M(\tilde{q}) >> M(\tilde{l})$ — cross section is maximal

  $M(\tilde{\chi}_1^\pm) > 132\ GeV$





Future

- Including the eτl & μτl analyses gives better sensitivity
  - Limit improved by 10% for tanβ=3
  - More expected at large tanβ, where τ's dominate the final state
- Cross section limit 0.05-0.01 pb
- L=1 fb^{-1}: probe chargino masses up to 100-170 GeV/c^2
- L=8 fb^{-1}: probe chargino masses up to 150-240 GeV/c^2

Preferred by precision data

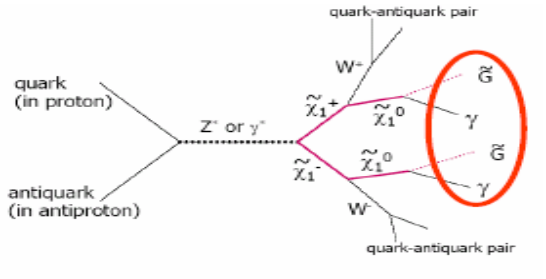
GMSB Chargino & Neutralino in $\gamma\gamma + E_T^{miss}$

D0 263 pb^{-1} & CDF 202 pb^{-1}: Combination: hep-ex/0504004

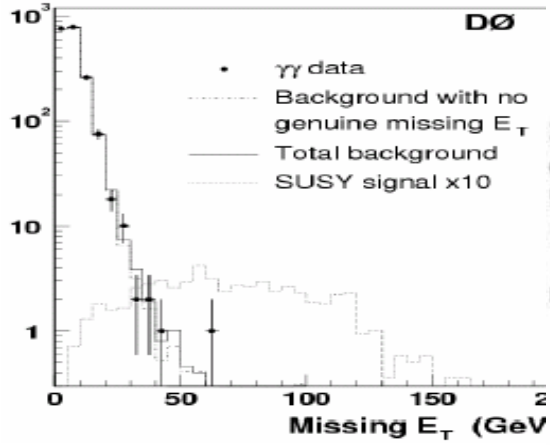
Selection: D0/CDF

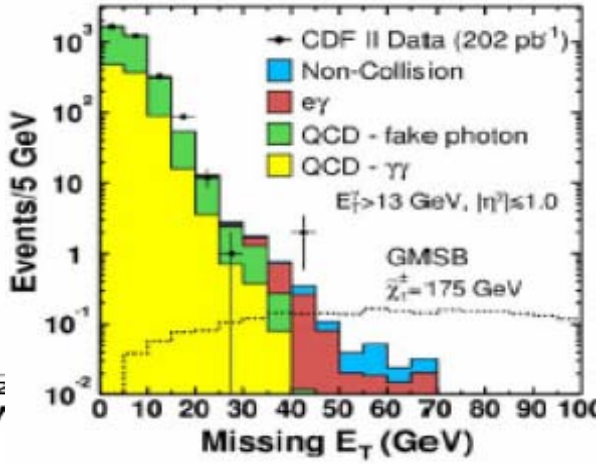
$E_T(\gamma) > 20/13$ GeV

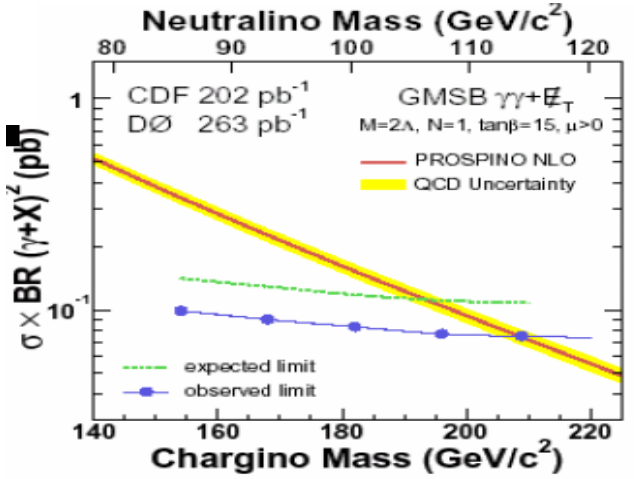
$E_T^{miss} > 40/45$ GeV



	Obs	Exp. SM	M($\chi^{\pm}$) (GeV)
D0	2	3.7±0.6	>195
CDF	0	0.3±0.1	>167







$M_m = 2\Lambda$, $N_5 = 1$, $\tan\beta = 15$, $\mu > 0$

M($\chi^{\pm}$)>209 GeV/c2

M(χ^0)>114 GeV/c2

Production of a pair of CMSP

("stable" $\tilde{\tau}$ or $\chi^{\pm}$)

Charged Massive Particles with $c\tau > 10$ m
Appear as slow moving high P_T μ
Timing of the μ scintillators used
speed significantly slower than c
D0 390 pb^{-1}: 0 candidates observed
0.66 ± 0.6 event expected
No SM background

Limits: $\int L\,dt \approx 390\ pb^{-1}$

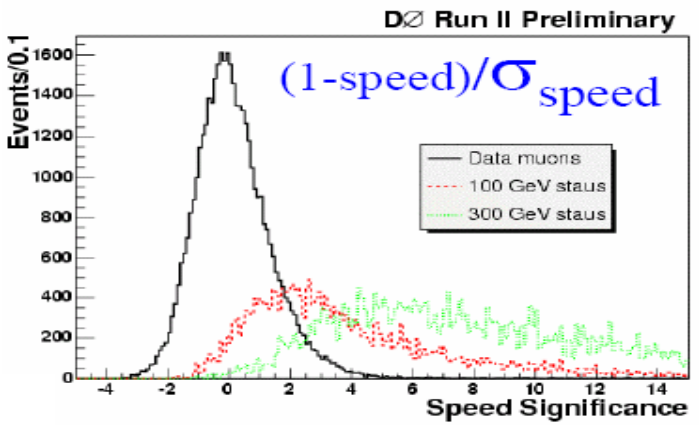
GMSB: CMSP is $\tilde{\tau}$

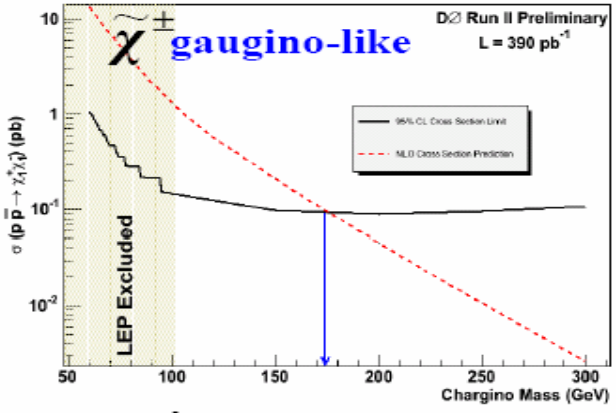
σ^{limit}=0.06-0.62 pb not sensitive yet

AMSB: CMSP is $\tilde{\chi}^{\pm}$ $(\Delta M(\tilde{\chi}_1^{\pm} - \tilde{\chi}_1^0) < 150\,MeV)$

Higgsino-like: $m_{\chi^+} > 140$ GeV

Gaugino-like: $m_{\chi^+} > 174$ GeV

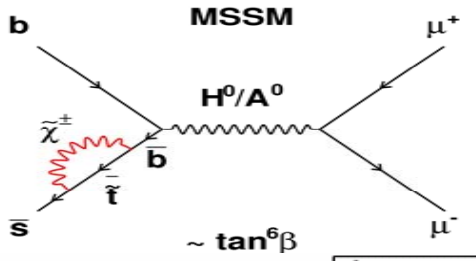




Rare Decay: $B_S \rightarrow \mu^+\mu^-$

In SM, small BR ~ 3.5x 10^{-9}
but in SUSY, enahancement ~ $(\tan\beta)^6$ factor

$$B(B_S \rightarrow \mu^+\mu^-) \propto \tan^6\beta / m_A^4$$



Selection

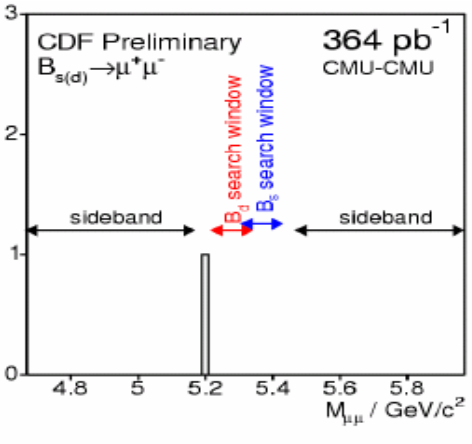
$\mu^+\mu^-$ (P_T>2-3 GeV) from displaced vertex

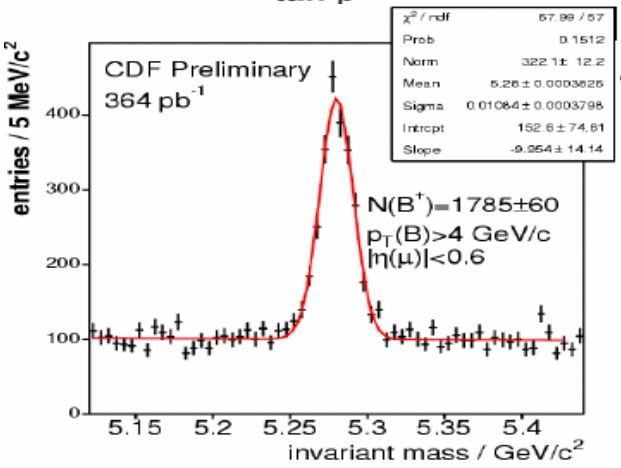
Count events inside a M($\mu\mu$) window (±100 MeV around the B_S mass)

→ 0 event observed

Normalize the upper limit

$B^{\pm} \longrightarrow J/\Psi\, K^{\pm}$ events





at 90%C.L	Lum. (pb-1)	BR($B_s \rightarrow \mu+\mu-$)
CDF	364	$< 1.5\ 10^{-7}$
DØ	300	$< 3.0\ 10^{-7}$
Combined: CDF+DØ:		$< 1.2 \times 10^{-7}$

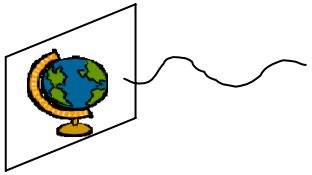
Extra Dimensional Models

Alternatives to SUSY for solving the hierarchy problem:
M_{EW} (1 TeV) << M_{Planck} (10^{19} GeV)?

ADD

Arkani-Hamed, **D**imopoulos, **D**vali,
Phys Lett B429 (98)

Many large compactified EDs
In which G can propagate



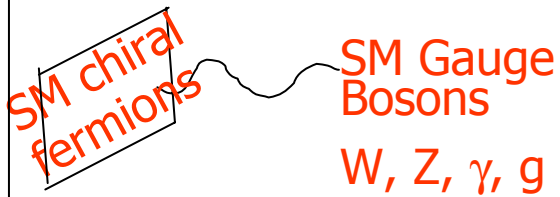
$M_{Pl}^2 \sim R^n M_{Pl(4+n)}^{(2+n)}$

Effective $M_{Pl} \sim$ 1TeV → if compact space (R^n) is large

TeV^{-1}

Dienes, Dudas, Gherghetta,
Nucl Phys B537 (99)

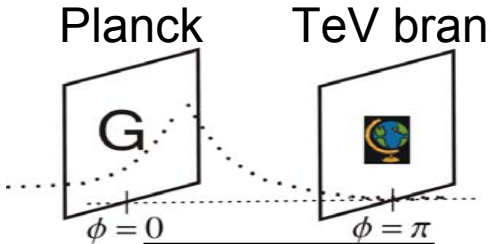
TeV^{-1} sized EDs



RS

Randall, **S**undrum,
Phys Rev Lett 83 (99)

1 highly curved ED
Gravity localised in the ED



$\Lambda_\pi = \overline{M_{pl}} e^{-kR_c\pi}$

$\Lambda_\pi \sim$ TeV

if warp factor $kR_c \sim$11-12
k/M_{Pl}, k: curvature scale

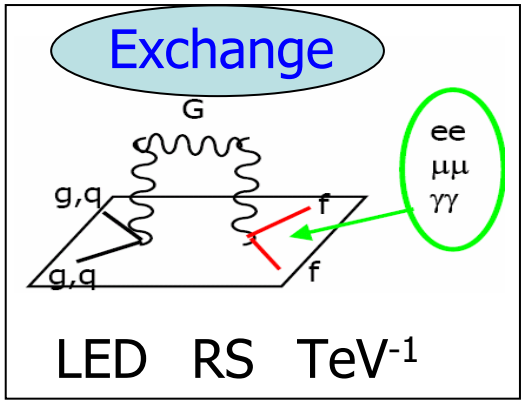
Tevatron Exchange ED Search Strategies

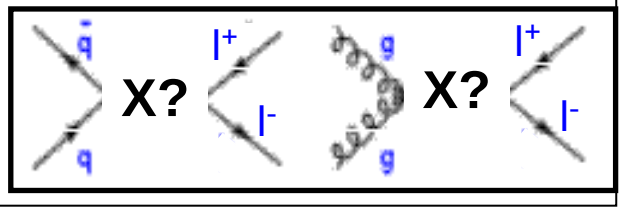
CDF Search Strategy: ee, μμ, γγ

New

- Perform signature based searches
  - Compare data to expectation
  - 1D fits in invariant mass performed
  - (and angular distribution studied)
- Determine spin dependent acceptance
  - and then σ.BR
- Interpret data & set limits
  - on many new models!

  E.g. (ee & μμ): Spin-0 : RPV sneutrinos
  Spin-1 : Z′, Technicolor ρ, ω
  Spin-2 : RS G, LED, etc..





D0 Search Strategy: ee, μμ, γγ

- Perform model specific searches
- Optimise for specific search:
  - ADD case: combine ee+γγ to gain in efficiency
- 3D fits in angular distribution and invariant mass performed

ADD LED: D0 ee+γγ & μμ

ADD: many Large ED in which gravitons can propagate

Search for spin-2 broad σ change

⇒ study invariant mass & angular distribution

Search Selection 200 pb^{-1}

2 two isolated EM objects, E_T>25GeV

2 central (CC)

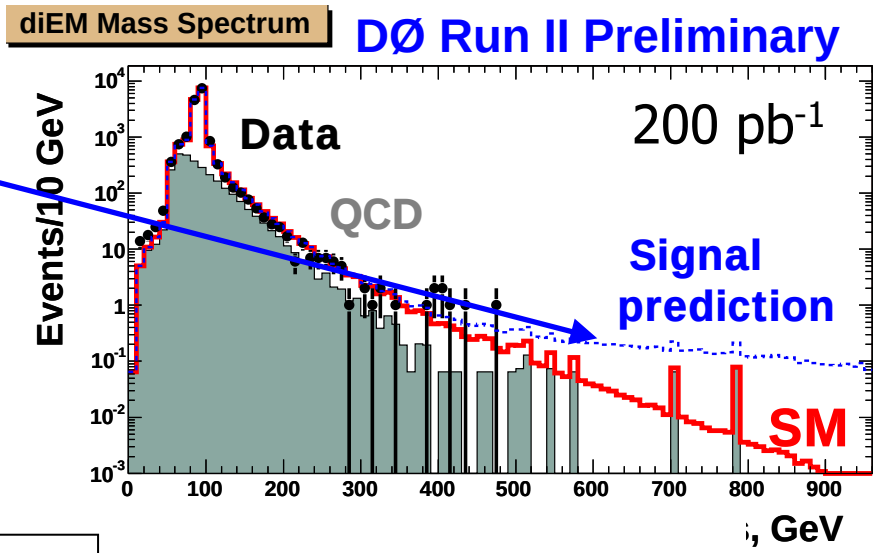
or 1 plug and 1 central (EC)

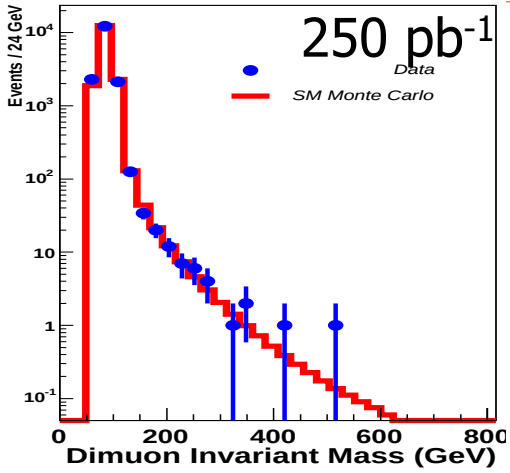
D0 combine ee+γγ ⇒ diEM search

This maximises reconstruction efficiency….

Search Selection 250 pb^{-1}

$p_T^{\mu 1,\mu 2}$>15 GeV, $M_{\mu\mu}$>50 GeV



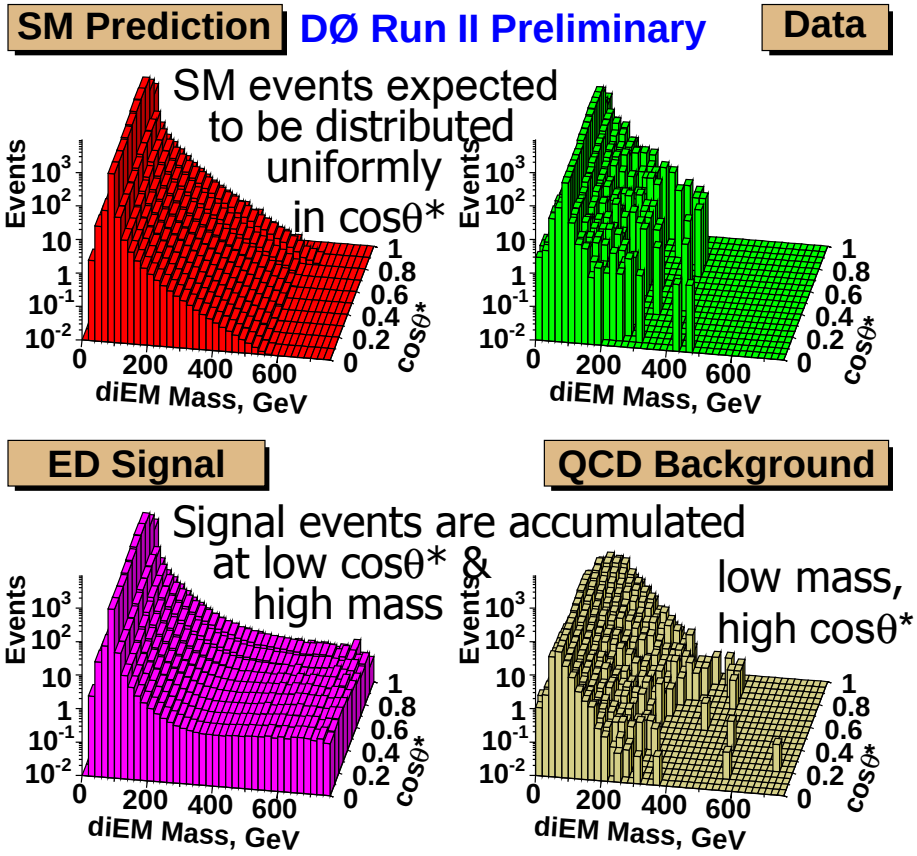


DØ Run II Preliminary

ADD LED: D0 ee+γγ & μμ

D0 perform a combined fit of the invariant mass and angular information

Fit combined $M_{ee,\gamma\gamma}$ and cosθ* spectrum to extract limits



- Parameterise σ in terms of $\eta = \lambda / M_s^4$

$$\sigma = \underbrace{\sigma_{SM}}_{\text{SM}} + \underbrace{\eta\sigma_{INT}}_{\text{Interference}} + \underbrace{\eta^2\sigma_{KK}}_{\text{ED term}} + \underbrace{\sigma_{BG}}_{\text{Background}}$$

- 3D templates used to set limits
- Bayesian likelihood fitting used to set 95%CL on η_G
- η_G translated into a 95% CL mass limit on fundamental Planck Scale (M_s)

Tevatron ADD LED limits

Both D0 and CDF have observed no significant excess

95% CL lower limits on fundamental Planck scale (M_s) in TeV, using different formalisms:

	GRW	HLZ for n=					Hewett
		2	3	4	5	6	7	λ=+1/-1
D0 Run II: μμ	1.09	1.00	1.29	1.09	0.98	0.91	0.86	0.97/0.95
D0 Run II: ee+γγ	1.36	1.56	1.61	1.36	1.23	1.14	1.08	1.22/1.10
D0 Run I+II: ee+γγ	1.43	1.61	1.70	1.43	1.29	1.20	1.14	1.28/NA
CDF Run II: ee	1.11		1.32	1.11	1.00	0.93	0.88	0.96/0.99

D0 Run II μμ result: tightest limits on LED from a single measurement in this channel!

D0 combined ee+γγ Run I & Run II result is the most stringent limit on LED to date!

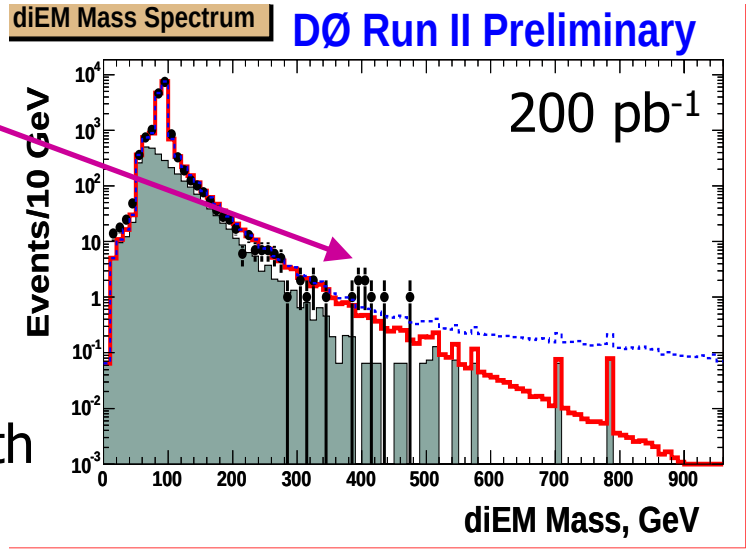
D0's High Mass (ee & $\gamma\gamma$) Events

Hints of New Physics?

8 events with M>350 GeV

- 6 form a bump around 400 GeV
  - $Z' \rightarrow ee$ resonance?
    - •No: have 1 or 0 tracks AND
    - •Bump twice as narrow as expected from a narrow resonance smeared with typical D0 EM calorimeter resolution
- 2 highest mass events:
  - have very low $\cos\theta^*$ (0.01, 0.03)
  - One is a e^+e^- pair and the other $\gamma\gamma$

⇨ excellent candidates for new physics beyond the SM!



i.e. possess kinematics typical of signal from large ED. (Very high scattering angle: close to $\pi/2$.)

Intriguing events – but consistent with the SM

TeV^{-1} Size ED: ee+$\gamma\gamma$

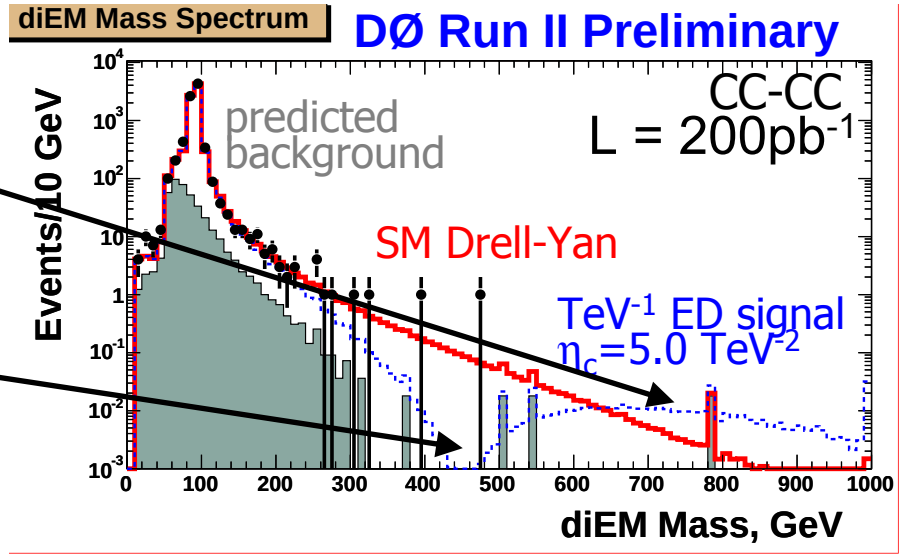
New

First dedicated experimental search for TeV^{-1} Size ED at a collider

Search for effects of virtual exchanges of the KK states of the Z and γ

Search Signature:
Signal has 2 distinct features:

- enhancement at large masses (like LED)
- negative interference between the 1st KK state of the Z/γ and the SM Drell-Yan in between the Z mass and M_C



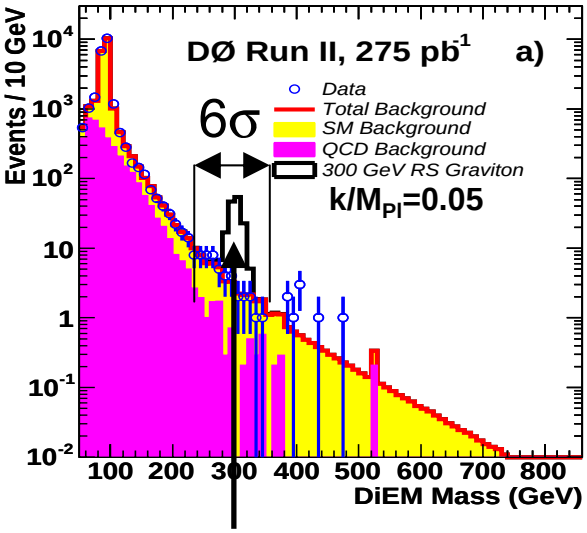
Lower limit on the compactification scale of the longitudinal ED:
M_C>1.12 TeV at 95% C.L.

World Combined Limit: M_C >6.8 TeV at 95%C.L.
Better limits come from precision measurements

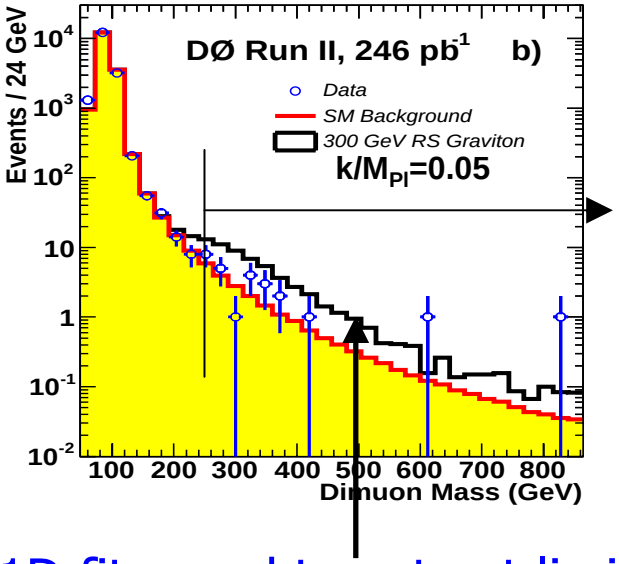
RS ED: ee+γγ & μμ

RS: 1 extra compactified/warped ED in which G can propagate
Search for spin-2 **resonance** in invariant mass spectrum

Search Selection $275pb^{-1}$
2 isolated EM objects with E_T>25 GeV
2 central e (CC)
or 1 forward and 1 central e (EC)



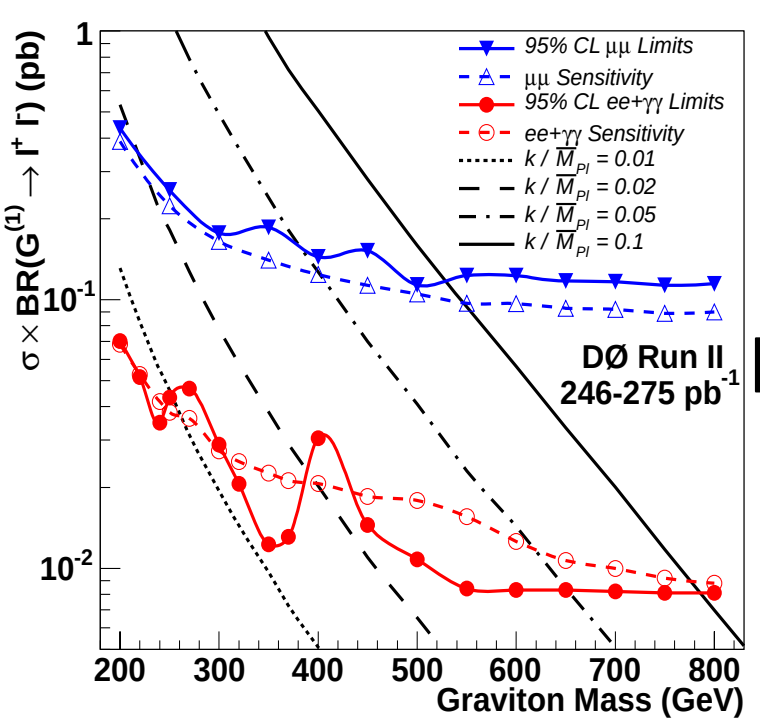
Search Selection
2 high Pt (>15 GeV) μ

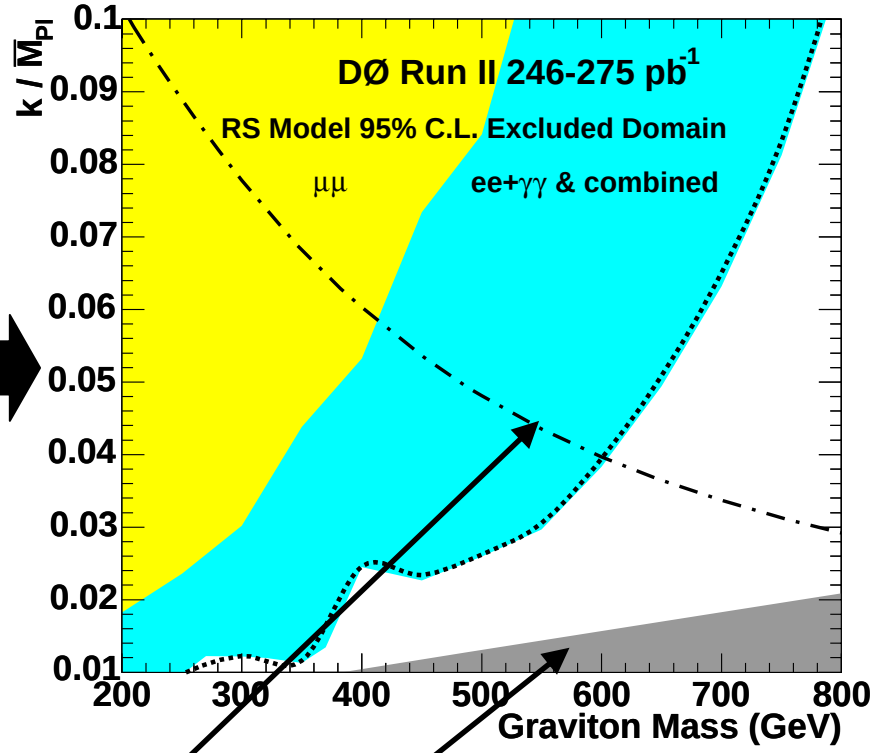


1D fits used to extract limits

Different search windows are used for the ee+γγ : μμ channels because of the different detector component resolutions

RS ED Results





Excluded mass limits:
785 GeV for $k/M_{Pl}=0.1$
250 GeV for $k/M_{Pl}=0.01$

Below excluded from precision electroweak data

Λ_π>10 TeV which requires a significant amount of fine-tuning

Most restrictive limits on the RS model parameters to date!

RS ED: ee (PP), γγ

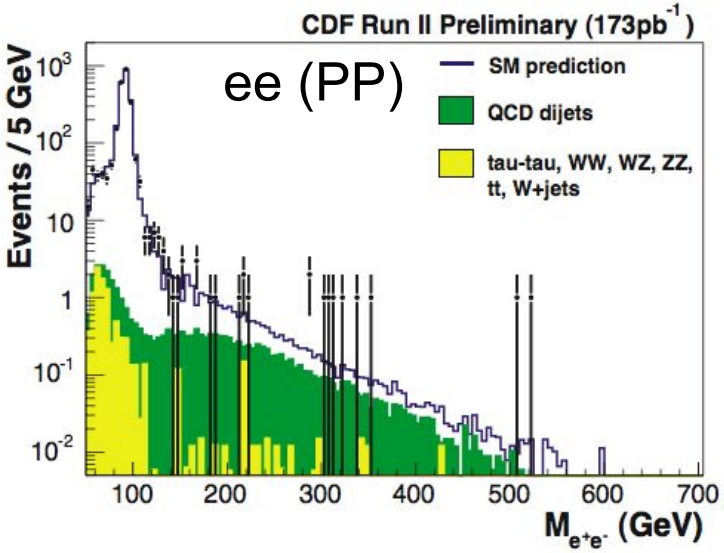
New CDF search for RS ED: ee (CC, CP, PP), μμ & γγ channels

Search Selection

2 forward EM clusters (PP)
isolated with E_T > 25 GeV

New for Run II: increase acceptance!

New tracking algorithm developed – require a silicon track

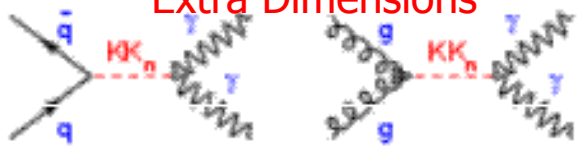


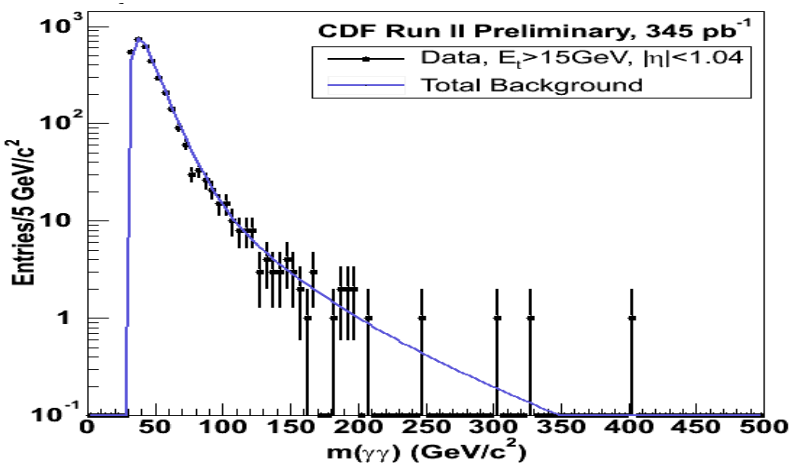
Search Selection

2 isolated central γ E_T>15 GeV

Standard Model

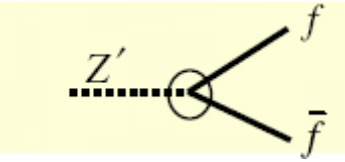
Extra Dimensions



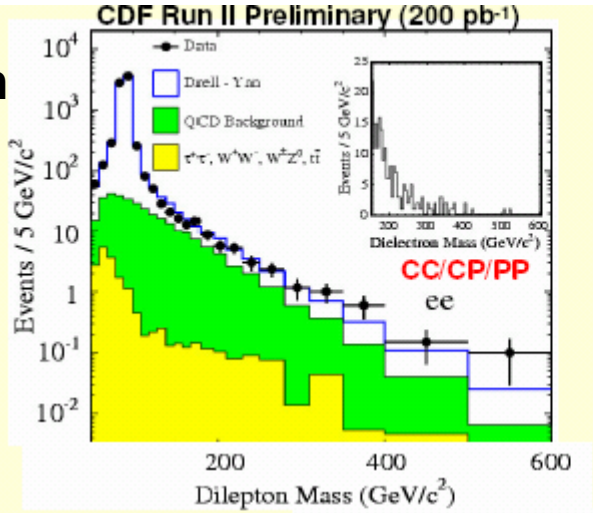


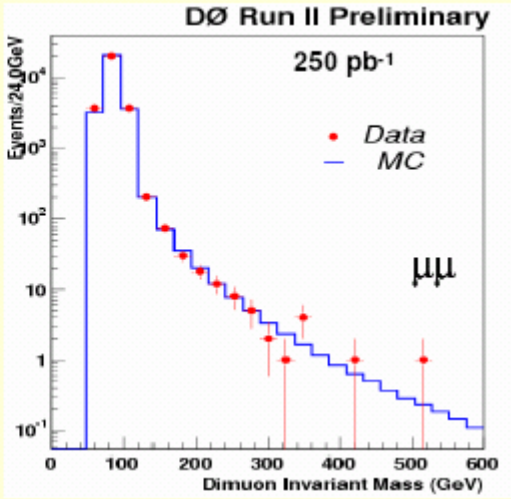
Traditional Z' searches

Most extensions to SM predict new gauge interactions
Most give neutral or singly charged bosons

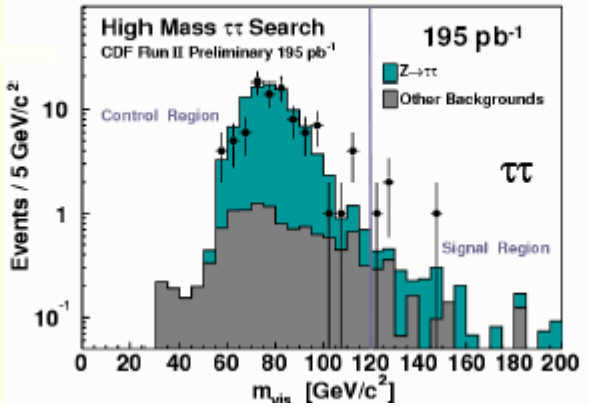


Selection
CDF use same datasets ee/μμ as for ED searches



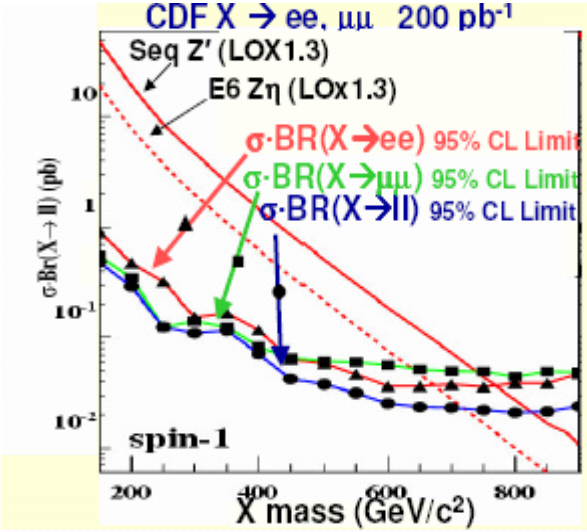


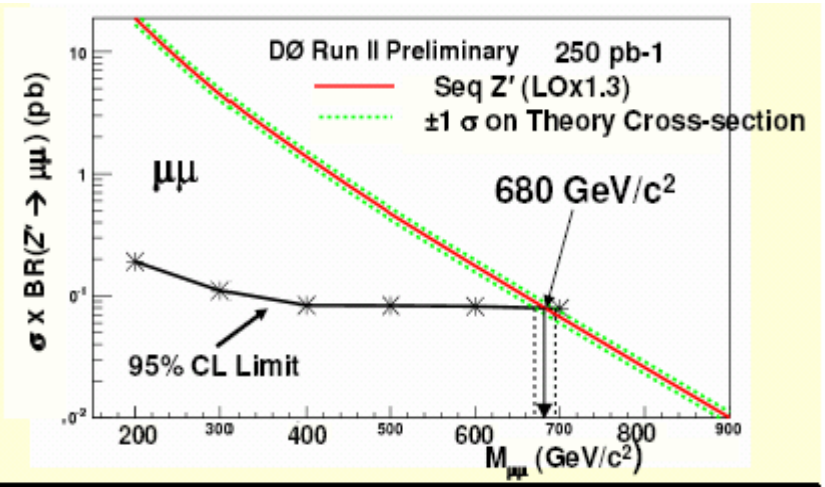
Visible mass(m_{vis}) formed from the visible decay products and $\not{E}_T$ in the event

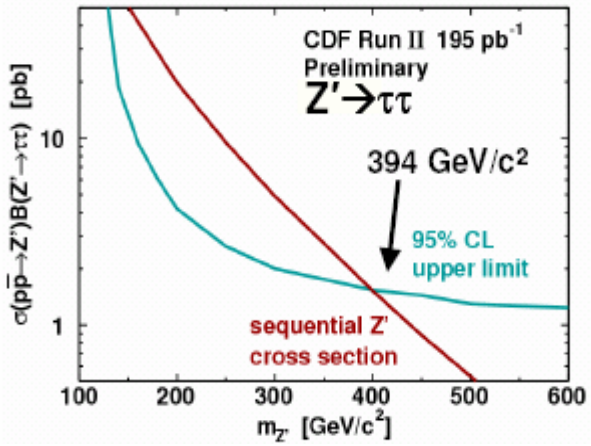


No excess observed in the lepton channels
⇒ Set limits

Z' Results







Seq Z' (GeV)	ee	μμ	ee+μμ	ττ	
CDF:	750	735	815	394	(200/pb)
D0:	780	680			(200 – 250 /pb)

E_6	Z_I	Z_χ	Z_ψ	Z_η	
CDF:	615	675	690	720	(ee+μμ)
D0:	575	640	650	680	(ee)

$Z' \rightarrow e^+e^-$ Search

New

Use dielectron mass Mee and cosθ*

Selection

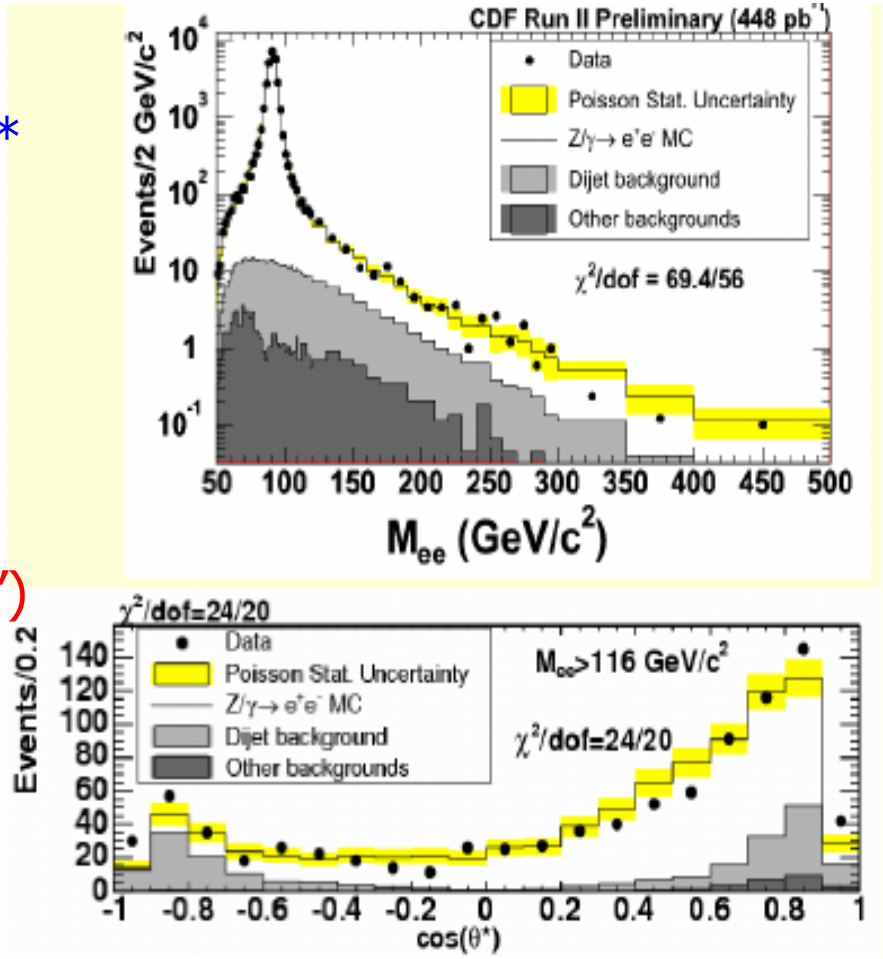
$Z' \rightarrow e^+e^-$

Adding angular information helps

For 448pb^{-1}:

using cosθ* = +25 % data (seq. Z')

No evidence of signal



Z′→ee Results

New

Use General formalism for Z′: Allows future models to be easily checked

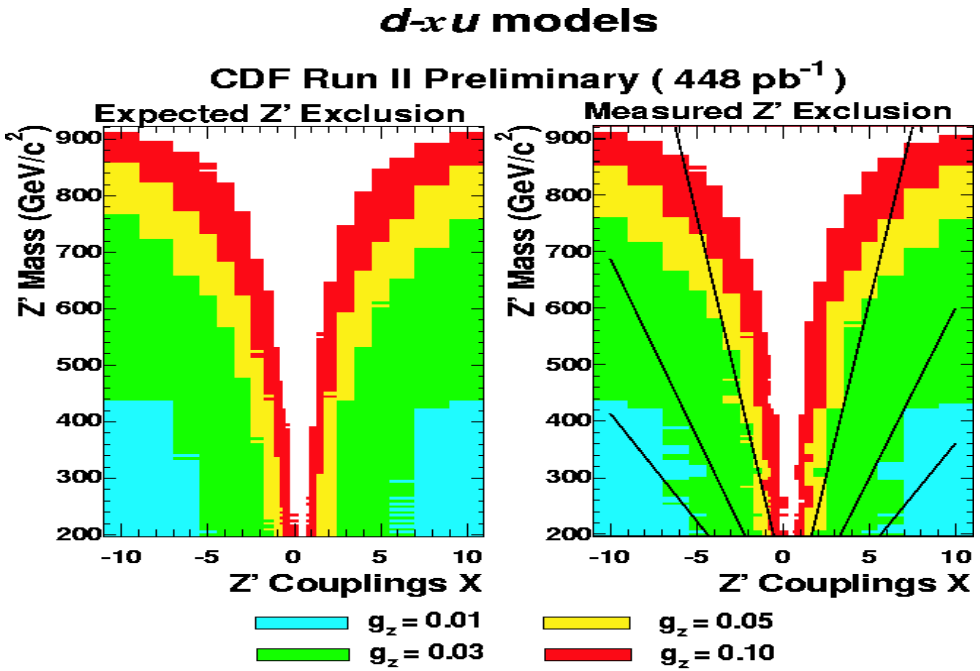
4 general model classes, each defined by 3 parameters

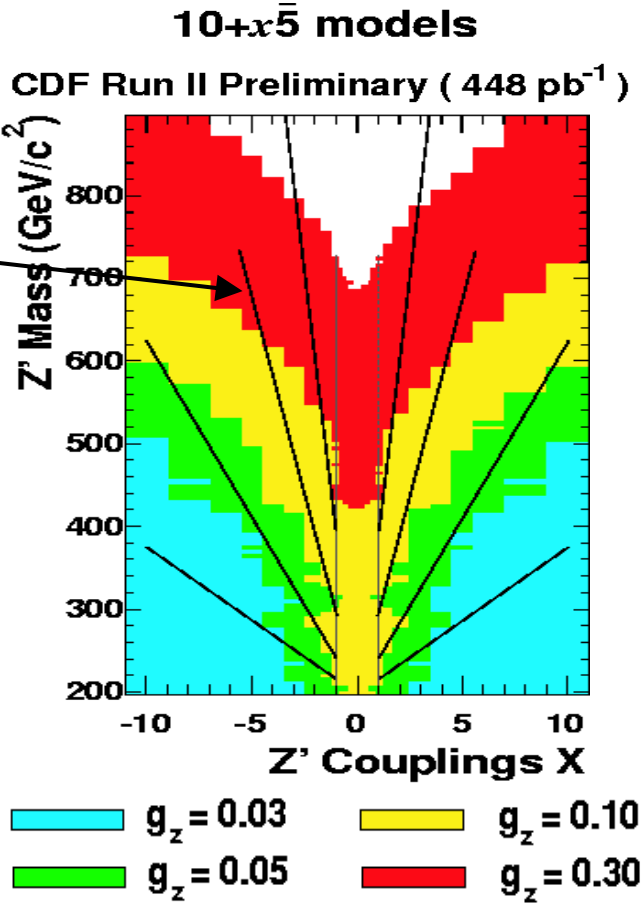
- Mass $M_{Z'}$
- Strength $g_{Z'}$
- Parameter x

Carena, Daleo, Dobrescu, and Tait (PRD 70:093009, 2004)

Below black curves are the LEP II exclusion regions:

LEP II→ indirect search via contact interactions





Conclusions

- CDF & D0 have performed & published/& are performing many exciting new physics searches:
  - Z', W', Extra Dimensions, leptoquarks, compositeness, SUSY, excited electrons .....
  - Only a few of the results presented here
  - Many are being refined/improved/updated
  - Results from 2 experiments are being combined

    $\Rightarrow$ so improved results to come!
- No evidence for new physics…… yet…..
- Already have a lot of new data to analyse & more on the way!

We hope to discover/find hints of new physics before the LHC!

http://www-d0.fnal.gov/Run2Physics/WWW/results/np.htm
http://www-cdf.fnal.gov/physics/exotics/exotic.html

CDF Publications

CDF Publications and Preprints for 2005

Search for B0(s) --> mu+ mu- and B0(d) --> mu+ mu- Decays in p anti-p Collisions at s(1/2) = 1.96 TeV**
D. Acosta et al., The CDF Collaboration, Phys. Rev. Lett. 93, 032001 (2005)
Abstract, PostScript (796KiB). 6875: Added: Thursday, 2005 March 03 11:03:29 CST

Search for Higgs Bosons Decaying into bb-bar and Produced in Association with a Vector Boson in p anti-p Collisions at s(1/2) = 1.8 TeV**
D. Acosta et al., The CDF Collaboration, FERMILAB-PUB-05-042-E. Submitted to Phys. Rev. Lett. March 22, 2005.
Abstract, PostScript (411KiB). 7374: Added: Thursday, 2005 March 24 12:31:33 CST

Search for Excited and Exotic Electrons in the e gamma Decay Channel in p anti-p Collisions at s(1/2) = 1.96 TeV**
D. Acosta et al., The CDF Collaboration, Phys. Rev. Lett. 94, 101802 (2005).
Abstract, PostScript (382KiB). 7035: Added: Tuesday, 2005 March 22 09:58:40 CST

Search for Anomalous Production of Diphoton Events with Missing Transverse Energy at CDF and Limits on Gauge-Mediated Supersymmetry-Breaking Models
D. Acosta, The CDF Collaboration, Phys. Rev. D71, 031104 (2005).
Abstract, PostScript (213KiB). 7085: Added: Friday, 2005 February 18 10:57:52 CST

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CDF Publications and Preprints for 2004

Search for Doubly-Charged Higgs Bosons Decaying to Dileptons in p anti-p Collisions at s(1/2) = 1.96 TeV**
D. Acosta et al., The CDF Collaboration, Phys. Rev. Lett. 93, 221802 (2004).
Abstract, PostScript (252KiB). 6988: Added: Tuesday, 2004 December 28 12:56:50 CST

Search for Scalar Leptoquark Pairs Decaying to nu nu-bar qq-bar in p anti-p Collisions at s(1/2) = 1.96 TeV**
D. Acosta et al., The CDF Collaboration, FERMILAB-PUB-04-303-E. Submitted to Phys. Rev. Lett. October 25, 2004.
Abstract, PostScript (324KiB). 7200: Changed: Wednesday, 2004 December 22 08:22:54 CST

Search for Kaluza-Klein Graviton Emission in p anti-p Collisions at s(1/2) = 1.8 TeV using the Missing Energy Signature.**
D. Acosta et al., The CDF Collaboration, Phys. Rev. Lett. 92, 121802 (2004).
Abstract, PostScript (315KiB). 6501: Added: Friday, 2004 April 02 15:58:55 CST

Search for Pair Production of Scalar Top Quarks in R-parity Violating Decay Modes in p anti-p Collisions at s(1/2) = 1.8 TeV**
D. Acosta et. al., The CDF Collaboration, Phys. Rev. Lett. 92, 051803 (2004).
Abstract, PostScript (317KiB). 6339: Added: Friday, 2004 February 06 12:58:37 CST

D0 Publications

- **New Physics**
- Search for Randall-Sundrum Gravitons in Dilepton and Diphoton Final States, Figures, 260 pb-1, hep-ex/0505018, Plain English Summary, FERMILAB-PUB-05/126-E, *PRL 95 091801 (2005)*
- Search for first-generation scalar leptoquarks..., Figures, 252 pb-1; hep-ex/0412029, Plain English Summary, FERMILAB-PUB-04/389-E; *PRD 71, 071104 (2005)*
- A search for anomalous heavy-flavor quark production..., Figures, 145-164 pb-1; hep-ex/0411084, Plain English Summary, FERMILAB-PUB-04/359-E; *PRL 94, 152002 (2005).*
- Search for Supersymmetry with Gauge-Mediated Breaking in Diphoton Events at DØ, Figures, 263 pb-1; hep-ex/0408146; Plain English Summary, FERMILAB-PUB-04/198-E; *PRL 94, 041801 (2005).*

- **Higgs**
- A measurement of the ratio of inclusive cross sections Zb/Zj..., Figures, 152-184 pb-1; hep-ex/0410078, Plain English Summary, FERMILAB-PUB-04/297-E; *PRL 94, 161801 (2005)*
- A search for Wbb and WH production in ppbar collisions at sqrt(s)=1.96 TeV, Figures, 174 pb-1; hep-ex/0410062, Plain English Summary, FERMILAB-PUB-04/288-E; *PRL 94, 091802 (2005)*
- Search for Doubly-charged Higgs Boson Pair Production..., Figures; hep-ex/404015, Plain English Summary, FERMILAB-PUB-04/045-E; *PRL 93, 141801 (2004)*