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A Review of Recent Results from the Tevatron

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The D0 and CDF experiments have been taking data at the Run II of the Tevatron Collider since 2001. We present a selection of recent results, most of them obtained with an integrated luminosity of $\simeq 1$ fb^{-1}. I will desrcibe the most important facets of the physics programme and detail some results. Recent direct limits to standard model Higgs obtained at the Tevatron, and their their perspectives will be also reviewed.

1 Introduction

The D0 and CDF experiments are two 4π multi-purpose detectors taking data at the Tevatron Collider. Run II (started in 2001) is designed to provide each detector with $4 \div 8$ fb^{-1} of $p\bar{p}$ collisions by the end of 2009. With respect to Tevatron Run I, the accelerator complex underwent a large upgrade which radically changed the way it operates. The interbunch distance was reduced from $3.5\mu s$ to 392 ns, the whole $\bar{p}$ production, cooling and stacking was revised. As a result, after a relatively long startup, the accelerator is now performing very well. The peak luminosity reached 2.92 $10^{32}cm^{-2}s^{-1}$ and is now delivering about 40 pb^{-1}/week with a record of 45 pb^{-1} in a single week. Based on the current performances, the integrated luminosity per experiment extrapolates to $6 \div 8$ fb^{-1}/experiment by the end of 2009.

The CDF and D0 detectors were upgraded to fully exploit the physics opportunities provided by the Tevatron. CDF completely rebuilt its tracking system (both the outer chamber and the silicon tracker), the forward calorimetry, its trigger and front end electronics and extended the muon coverage. It also added the capability to trigger on tracks at Level1 (i.e. syncronous with bunch crossing) and to identify and trigger on tracks displaced with respect to the primary vertex at Level 2. The silicon tracker is an important asset of its physics programme with a precision single sided layer located right on the beam pipe, five layers of double sided silicon sensors at various radii between 2.5 and 10 cm and two layers located at $\simeq 20$ and $\simeq 28$ cm covering $|\eta| < 2$ and $1 < |\eta| < 2$. respectively.

D0 changed its philosophy by becoming a full magnetic spectrometer with the addition of a 2 Tesla superconducting solenoid. It also replaced its old tracker with a new 8-layers fiber tracker which -combined with a microvertex silicon detectors- provides a powerful instrument to reconstruct tracks coming from the primary vertex and to offline identify vertices due to long-lived particles. D0 also improved its acceptance for muons and upgraded the trigger system. Recently, in the shutdown of 2006, the collaboration added an extra layer of silicon sensors located right outside the beam pipe.

The detectors collect data with an efficiency of $\simeq 90$ %. The small inefficiency is partly due to a deadtime coming from the trigger and Data Acquisition and partly to operational costraints. As we write $\simeq 2.5$ fb^{-1} were written to tape by each experiment. However, in the following, unless otherwise indicated, I will present results obtained with $\simeq 1$ fb^{-1}, less than half of the data on tape.

2 Flavour Physics

Despite the large production cross section, processes involving HF remain largely buried under a large background. CDF Run I pioneered the identification of heavy flavour at hadron colliders by detection of secondary vertices, a powerful tool complementary to other tagging techinques. In Run II the experiment increased its B-physics reach by adding the capability to trigger on tracks not coming from the primary vertex (SVT). A number of b and c -related physics processes, otherwise completely buried by a large background, can theferore be selected online for further analyses. Thanks to its microvertex detector and to its large muon coverage D0 is also able to perform a number of measurements. Details can be found in [2], here I only mention a few, very interesting results.

In Spring 2005 D0 presented a limit to B_s oscillations using 0.9 fb^{-1} of $14.9 < \Delta m_s < 21$ ps^{-1} at 90% C.L. With 1 fb^{-1} CDF presented (Fall 2005) a 5 σ observation of B_s oscillations (Fig. 1) and a measurement of $\Delta m_s = 17.77 \pm 0.10(stat) \pm 0.07(syst)$ ps^{-1}. D0 exploits a combination of its measurement of the $B_S \to J\Psi\phi$ channel and of the B_s semileptonic decays together with results from the B factories and CDF Δm_s to obtain a measurement of $\phi_s = 0.70^{+0.47}_{-0.39}$ [2].

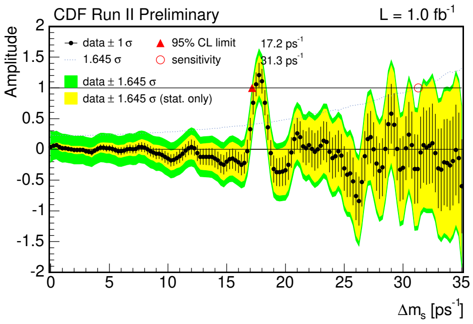

Figure 1: Amplitude scan for Δm_s ar CDF.

CDF and D0 search for rare B decays. Thanks to the SVT CDF to directly measures $B \to hh$ decays and their A_{CP}. B_d,B_s decays to $\mu\mu$ have tiny SM branching fractions (O(10^{-9}) which are enhanced (by powers of $\tan\beta$) in several SUSY models, therefore both Collaborations search for new physics through this channel. CDF has not yet update its measurement performed with 0.8 fb^{-1}, while D0 just presented its result with the full dataset of 2 fb^{-1}. Combining the IIa (without the silicon layer on the beampipe) and IIb data they find 3 candidate events with a background of 2.3$\pm$ 0.7 and set a limit for $B_s \to \mu\mu < 9.3(7.5)\cdot 10^{-8}$ at 95(90) % C.L. and $B_d \to \mu\mu < 2.3(2.0)\cdot 10^{-8}$ at 95(90) % C.L. This result (which will soon be improved by adding the CDF search), sets interesting limits on many SUSY models by excluding zones in the $\tan\beta - M_A$ plane [4]. We expect that by 2009, with 8 fb^{-1}, the Tevatron will be able to set a limit of $\approx 2 \cdot 10^{-8}$ to the B_s decay.

state	Mass value ± stat. ± syst.
Σ_B^+	$5808^{+2.0}_{-2.3} \pm 1.7$
Σ_B^-	$5816^{+1.0}_{-1.0} \pm 1.7$
Σ_B^{*+}	$5829^{+1.6}_{-1.8} \pm 1.7$
Σ_B^{*-}	$5379^{+2.1}_{-1.9} \pm 1.7$

Table 1: Σ_B and σ_B^* masses (in MeV/c^2).

Search for rare decays of known states is complemented by the search for new states, and CDF recently presented the observation of two ne B baryons: Σ_B and Σ_B^* with masses shown in table 1. Last but not least, new measurements of Λ_B lifetime are presented. CDF measures (exclusive states) $1.5 \pm 0.077 \pm 0.012$ ps while D0 reports $1.28 \pm 0.11 \pm 0.09$ ps in semileptonic decays and $1.3 \pm 0.14 \pm 0.05$ ps in exclusive channels [2].

3 QCD and jet physics

Test of the strong interactions and measurements of jet distributions has been the bread and butter physics at the Tevatron for more than 20 years. Besides testing theoretical prediction those processes are often used to test algorithms but they also play an important role to estimate the background in rare processes and searches for new physics. This dual aspect is present in many analyses. Details can be found in the many Tevatron contributions to this Conference [3]. In the following I will only refer to a small subset.

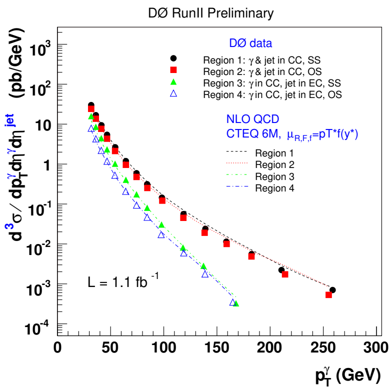

Figure 2: D0 triple differential $\gamma - j$ cross section.

Thanks to the large statistics available it is now possible to precision-measure associated production of jet and vector bosons (W, Z, γ). D0 measures the triple differential cross section in the $\gamma - jet$ process (Fig. 2) where finds a good agreement with available NLO QCD calculations. CDF finds a good agreement between its inclusive jet distribution and theoretical prediction. The difference between theory and CDF data of Run I, has now disappeared. The large statistics, combined with the exploitation of the SVT trigger. allows CDF to study $b\bar{b}$ correlations in a small dataset ($\simeq 260$ pb^{-1}). Existing MC do not fully describe the data, as you can see from figure 3 where several MC are used for the comparison. The region in which the two bs are close in φ exhibits a clear deviation of data with respect to calculations. Even the improvement obtained by using Jimmy (a Monte Carlo describing multiple parton interactions) does not fully account for this difference, which happens in the region where gluon splitting is expected to provide a sizeable contribution to the process.

4 Electroweak Physics Measurements

Electroweak (EWK) processes can be used to better understand the capabilities of the detectors and to develop new tools (from trigger to analysis techinque). They also often represent background for searches. With its large dataset, the Tevatron became a place where precision EWK meaurements can be performed to test the SM at its boundaries.

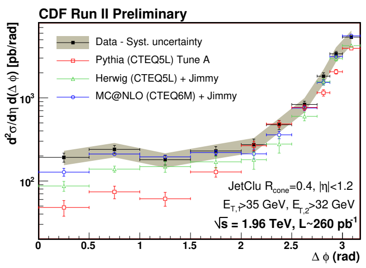

Figure 3: $\Delta\varphi$ between two identified bs

Among the many results, I chose a few which are significant for their implications. The W and Z integral and differential cross sections provide an excellent testing ground for PDFs. NLO and NNLO calculations of the inclusive processes have been available for quite some time and recently a full differential calculation at NNLO became available [7]. The large statistics collected allows CDF to present a $d\sigma/dy$ for $Z \to ll$ events (Figure 4). While the agreement with theory is good, this measurement -with increasing statistics- can be used to costrain PDFs. Recently CDF measured the ratio of central-to-forward cross section for $p\bar{p} \to W + X$ with the $W \to e\nu$ and demonstrated a sensitivity of this quantity to PDFs. This can be a promising way to study PDFs at the LHC where W asymmetry measurement will play a less prominent role [6].

Tevatron experiments recently obtaiend significant results in the diboson sector. The tiny cross sections (of the order of a few pb, less than the top cross section) challenged the experimentalists' determination and ingenuity. Diboson production represents also a test bed for the detection of of Higgs and indeed represents a background in several channels.

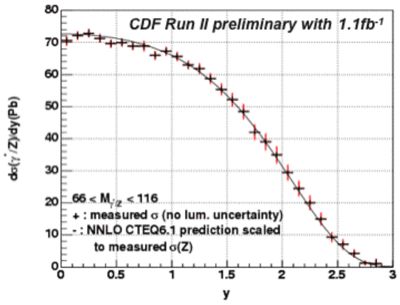

Figure 4: $d\sigma/dy$ for $Z\gamma* \to ee$ CDF events.

In Summer 2006 D0 presented its evidence (plot) of a WZ, with $WZ \to l\nu l\nu$ signal at 3.3 σ level and a cross section of $3.98^{+1.91}_{-1.53}$ pb (statistical and systematic uncertainty combined), consistent with SM expectation of 3.7 ± 0.1 pb In Winter 2007 CDF confirmed its previous evidence observing a signal of 16 events with a background of $2.7 \pm 0.28 \pm 0.33 \pm 0.09$. The probability of a null signal is $< 1.5 \times 10^{-7}$ equivalent to a $\simeq 6\sigma$ effect. The measured cross section is $5.0^{+1.8}_{-1.6}$ pb (statistical and systematic uncertainty combined). In this case the improvement did not come from a larger dataset availabe but rather from improved analysis techinque and a larger lepton acceptance.

Another challenging process is $ZZ \to llll$. CDF shows a 3σ evidence (Figure 5) and measure a cross section of $0.75^{+0.71}_{-0.54}$ pb, compatible with the NLO prediction of 1.4 ± 0.1 pb. At present the case in which one of the two bosons decays hadronically still remains unobserved.

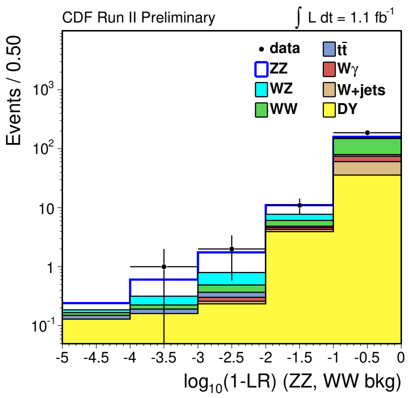

Figure 5: Log-Likelihood ratio for ZZ candidates superimposed to background.

The gauge structure of the SM finds a crucial test in the associated production of $W\gamma$. The destructive interference at tree level of the relevant diagrams creates a zero in the $dN/d\cos\theta^*$ distribution at $cos\theta^* = \pm\frac{1}{3}$, where θ^* is the c.o.m. angle between the W and the incoming quarks. In our detectors we measure the charged lepton from the W decay and the sensitive variable is $Q \cdot \Delta\eta_{l,\gamma}$ where Q is charge of the lepton. The distribution of this quantuty still shows a dip at ≈ -0.3. As the photon does not directly couples to the Z the interference is not present in the $Z\gamma$ process. Both experiments measure the inclusive $W\gamma$ and $Z\gamma$ production cross section. CDF finds $\sigma(W\gamma) = 19.1 \pm 2.8$ pb and $\sigma(Z\gamma) = 4.9 \pm 0.5$ pb. D0 applies a cut to the photon E_T (>7 GeV) and to the transverse mass M(γ,l,ν) $> 90GeV$ and quotes $\sigma(W\gamma) = 3.2 \pm 0.5 \pm 0.2$(lum) and $\sigma(Z\gamma)$ of $4.51 \pm 0.4 \pm 0.3$ pb. D0 measures the $Q \cdot \Delta\eta$ distribution in 900 pb^{-1} and in its data there is evidence of a dip related to the destructive intereference predicted by the SM (Figure 6).

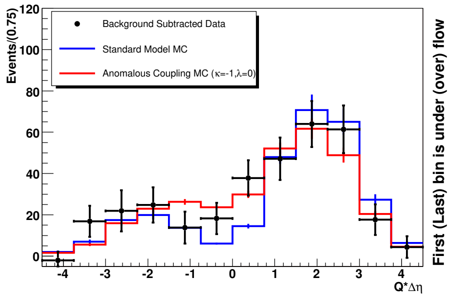

Figure 6: Signed $\Delta\eta_{l,\gamma}$ distribution at D0.

In the single boson realm, the most significant contribution came from CDF which directly measured the W mass and width. The traditional way is to study the transverse mass ($M_T = \sqrt{2 \cdot E_T^\nu \cdot E_T^l \cdot (1 - cos\theta_{l,\nu})}$ distribution where $l = e$,μ and neutrino transverse momentum is estimated from the transverse missing energy size and direction. The peak provides information about the W mass while the non-gaussian tail (due to the Lorentz distribution) about the W width. In its M_W measurement CDF also fits the transverse momentum distributions of the leptons. The result is $M_W = 80413 \pm 48$ MeV/c^2 where statistical and systematic uncertainties contribute evenly (34 MeV/c^2 each). This is the best measurement obtained by a single experiment. As it was performend on 200 pb^{-1}, while the current sample on tape exceeds it by a factor 12, is reasonable to expect a strong reduction of the statistical error. The systematics can also be addressed with a larger statistics and a precision of $\simeq 25MeV/c^2$ seems achievable. The measurement of $\Gamma_W = 2032 \pm 71$ MeV/c^2 (with 350 pb^{-1}) (Fig. 7), combined with Run I measurements, now dominates the World Average.

5 Top Physics

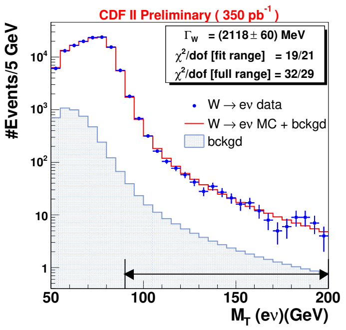

Figure 7: Fit to M_T in the $W \to e\nu$ channel.

Top quark production was first discovered at the Tevatron Collider in 1994-1995. Until the LHC starts it is still the only place where it can be studied and several new results are presented [9]

As the $\to bW \simeq$100 % of the times, one can classify the various decay channels according to the way the W boson decays. In this way one can measure *dilepton* channel (both Ws decay into $l\nu$), *lepton+jets* channel where only one of the two Ws decays leptonically and finally the *all-hadronic* channel in which both Ws decay hadronically. The final states contain, accordingly, one, two or no high P_T lepton. The structure of the Wtb vertex can be directly studied in top-pairs decays. Anomalous couplings (FCNC) and new physics might appear as deviation from SM expectations. Top cross section has been measured in essentially all decay channels.

Some comments are in order. The dilepton channel, by far the one with less background has a BF of only $\simeq 4.9$ % summing together the ee,$\mu\mu$,$e\mu$ channels. In order to improve statistics CDF selects event with one fully identified high-P_T lepton and an isolated high P_T track (fig). Its recent result with 1.1 fb^{-1} is $\sigma_{dil} = 9.0 \pm 1.3(stat) \pm 0.5(sys) \pm 0.5(lum)$ pb. D0 has a comparable result with a similar data sample: $\sigma_{dil} = 6.8^{+1.2}_{-1.1}(stat)^{+0.9}_{-0.8}(sys) \pm 0.4(lum)$ pb.

The $l+jets$ channel has a worst signal-to background ratio, therefore, since the beginning of top physics, it is customary to exploit the presence of two jets containing b quark. The characteristic signature due to the presence of long-lived particles is used to improve S/B. One can require one or two b tags (i.e. jets identified as containing b debris) with an efficiency that, for $t\bar{t}$ events reaches $\simeq 55$ %. While both CDF and D0 are trying to improve their b tagging algorithms to increase efficiency, the overall acceptance and S/B ratio are already good large to ensure that this channel is the most important in many top quark physics measurement. As for the cross section, the most recent result come from D0 (1 fb^{-1}) and is $\sigma_{l+j} = 8.3^{+0.6}_{-0.5}(stat)^{+0.9}_{-1.0}(sys) \pm 0.5(lum)$ pb.

In the fully hadronic channel the final state (6 jets) has a large multi-jet background to compete with. Therefore, after triggering the S/B is $\simeq 1/1300$. A combined neural-net based kinematic analysis and b tagging improve this ratio to $\simeq 1/16$. Thanks to this selection the result for the cross section is comparable to the other two channels. In $\simeq 1$ fb^{-1} CDF measures: $\sigma_{all-had} = 8.3 \pm 1.0(stat)^{+2.0}_{-1.5}(sys) \pm 0.5(lum)$ pb

With less than 50% of the data set analyzed, the cross section measurements are reaching the level of the theoretical NLO calculations. $\sigma_{t\bar{t}} = 6.7^{+0.7}_{-0.9}$ pb [10], $\sigma_{t\bar{t}} = 6.8 \pm 0.6$ pb [11]. A NNLO calculation might become quite interesting, even more when the LHC will come into operation although at the moment it appears too challenging to be addressed with standard calculation procedures.

All-hadronic (CDF, 943 pb^{-1})	171.1 ± 4.3
Dilepton (CDF, 1030 pb^{-1})	164.5 ± 5.6
Dilepton (D0, 1000 pb^{-1})	172.5 ± 8.0
Lepton+jets (CDF, 940 pb^{-1})	170.9 ± 2.5
Lepton+jets (D0, 900 pb^{-1})	170.5 ± 2.7
World Average	170.9 ± 1.8

Table 2: Best M_{top}results (in GeV/c^2).

Top decays before hadronizing, therefore there are no bound-states, unlike the other quarks. Therefore its mass, a fundamental quantity that combined with the W mass, provides us on insight on the Higgs sector, can me accurately measured. CDF and D0 measure M_{top} in each decay channel using several techniques. The original *template* method, where distributions from data were compared with expectations from (combined) top MC and background, is now complemented by Matrix Element (ME) and Dynamic Likelihood Method (DLM) where the intrinsic structure of the decay enters directly and help improving the measurement.

In table 2 we summarize the most recent results obtained with ≈ 1 fb^{-1}.

The new World Average is $M_{top} = 170.9 \pm 1.8$ GeV/c^2. While this measurement is largely dominated (about 70 %) by the results in the $l + jets$ channel, the all-hadronic channel is acquiring a more preminent role. The systematic uncertainty in this measurement is already 2.1 GeV/c^2 close to the 1.4 GeV/c^2 of the lepton+jets channel.

In previous measurements the dominant systematic effect came from the Jet Energy Scale (JES). JES indicates all the effects that -for a given measured jet energy- provide us with the information about the energy of the original parton. Both experiments are now calibrating *in situ* the JES by exploiting the constraint provided by the jets coming from the hadronic W decay. In this way the JES is included in the statistical uncertainty of the measurements and will indeed improve with larger data sets. For example the statistical uncertainty of the CDF $l+jets$ measurement (166 events) has indeed two contributions: 1.6 GeV/c^2 from statistics and remaining from JES.

With more than 2 fb^{-1} on tape, the future of top quark measurements look bright. The top mass will improve with the larger dataset, as the JES will be better constrained. Also, both experiments isolated a sample of $Z \to b\bar{b}$ events that can be used to set the b specific jet energy scale. In figure 8 we show the prediction for the top mass measurement at CDF. While, for example CDF is already doing better than predicted in the TDR [1], is difficult to estabilish what the asymptotic limit will be, but a precision < 1 % can be reached and the Tevatron can aim to a combined accuracy of ≤ 1 GeV/c^2, making this measurement a long lasting Tevatron legacy. Such an accuracy is, however, inducing both Collaborations to start addressing a number of effects that, too small to have an impact in the first measurements, can now become relevant. Moreover, a more general discussion of the meaning of the quantity measured is in order. CDF and D0, operatively uses Pythia Monte Carlo to generate top templates to which they compare data. With such an accuracy, of the order of the top natural width, one should be careful in interpreting the meaning of the measurement, in particular as we make larger use of DLM and ME methods.

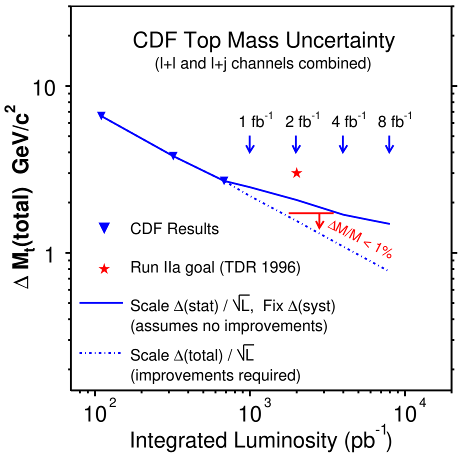

Figure 8: Prediction for M_{top} accuracy as a function of integrated luminosity.

The most significant recent result in terms of *top* production came from D0 which, for the first time, presented an evidence for *single top* production. This purely EWK process proceeds through two (s and t) channels, which have SM cross section of 0.88 and 1.98 pb respectively. While CDF sets a combined upper limit of 2.6 pb at 95 % C.L., D0 finds a 3.4 σ signal combining three analyses and advanced statistical techinques. Main reason is to identify the signal as a simple counting experiment does not have enough sensitivity to show evidence for this rare process. The measured production cross section is4.9 ± 1.4pb (Figure 9), as it is direcly proportional to $|V_{tb}|^2$, D0 is able to set a direct limit $0.68 < |V_{tb}| < 1$ at 95 % C.L.

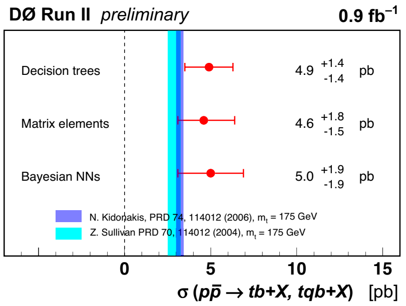

Figure 9: Evidence for single top.

6 Higgs Searches

In the SM the Higgs mass is directly connected to the W and top mass, therefore precision measurements of the W and top mass above mentioned translates into a limit $M_H < 144$ GeV/c^2 at 95 % C.L. which raises to 182 GeV/c^2 if one takes into accound the (direct) LEP II limit of $M_H > 114$ GeV/c^2. This result might imply some tension between the SM prediction and the observation, however it only appears at 1 σ level. Figure 10 shows the 95 % C.L. contour which demonstrates how only by the end of Run II one might really gather (indirect) information on the Higgs SUSY sector from the M_{top} and M_W measurements.

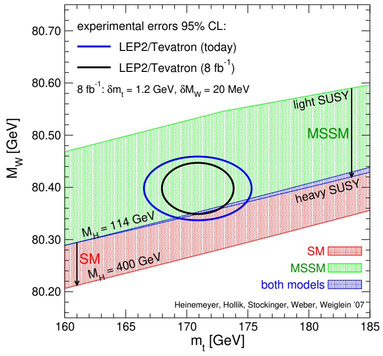

Figure 10: Constraints on SM and non-SM Higgs from indirect measurements

While the indirect measurement was always seen as the major contibution of the Tevatron to Higgs hunting, in recent years the increased luminosity delivered by the accelerator, pushed the two Collaborations to aggressively pursue direct Higgs searches. The experimental situation at the Tevatron has two bounds. One is the cross section. For low mass Higgs ($<$ 120 GeV/c^2) direct production from gluon fusion is still $\leq$ 1 pb, while associated production of Higgs with W or Z boson is about an order of magnitude smaller. In this region Higgs decay $\approx$ 80% of the times directly into $b\bar{b}$ pairs. The huge background due to heavy flavour jets forbids us from searching in the $b\bar{b}$ channel while the low cross section forbids us from searching for this production mode through its rare -but almost background freee- decays (like $\gamma\gamma$). Therefore in this region we concentrate on the search in the WH and ZH channel where the W and Z provides a clean signature and (most) of the triggering opportunities. The Higgs decay in two bs can be exploited to futher reduce the background by exploiting the b-tagging techinque, as already done in *top* events.

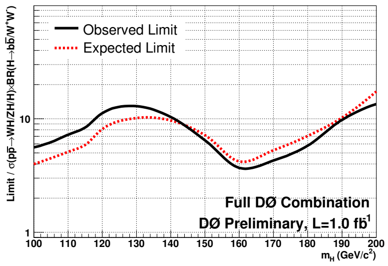

Figure 11: D0 direct Higgs limits($\simeq$ 1 fb^{-1}).

Recently the large data sample available opened up the opportunity to look for large mass Higgs ($\simeq$ 160 GeV/c^2) directly produced by gg fusion and decaying into W pairs. By exploiting the leptonic decays of the W the background is very low background and mostly due to SM processes. By increasing the acceptance as much as possible Tevatron experiments became quite competitive.

Both D0 and CDF presents results with 1 fb^{-1} in several channels. Figure 11 shows the combination of D0 results from many channels across the whole mass range of searches. The ratio 95% CL/SM is 8.4 for $M_H = 115$ GeV/c^2 and 3.7 for $M_H = 160$ GeV/c^2. With respect to Summer 2006 more analyses were performed and new techniques were used.

CDF does not provide a full combination of its searches. The most recent results, all with $\simeq 1$ fb^{-1} are in the ZH,$Z \to ll$, $Z \to \nu\nu$ channels and in the $H \to WW^*$ channel. In the first two searches the ratio woth respect to the SM cross section is 16 (for $M_H = 115$ GeV/c^2) while for the third is 5.6 for $M_H = 160$ GeV/c^2 (equivalent to a cross section limit of 2.2 pb).

Unfortunately no official Tevatron combined limit is still not available and, indeed, for example, the D0 combined limit alone is already better than the previous (Summer 06) Tevatron combined. Despite that, it is clear that, even before the end of Run II, the search for the Higgs at the Tevatron, will provide useful input to the LHC experiments.

7 Searches for New Physics

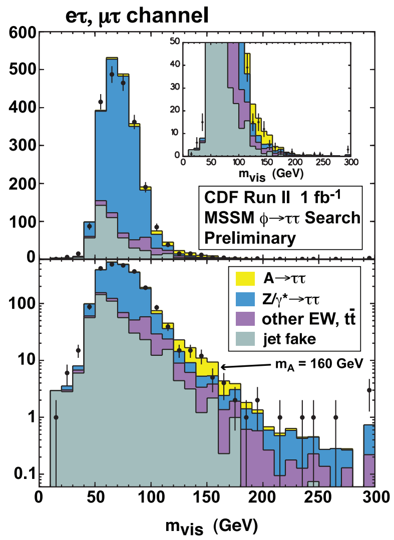

Figure 12: CDF Search for $H \to \tau\tau$.

The Tevatron is not only performing precision measurement of the SM, but is testing its frontier to check a number of theories which have been proposed as well as for any unknown possibility. It is not possible to fully present the whole set of analysis, ranging from SUSY to Extra Dimensions, Leptoquarks and more, which are -however- discussed in other contributions to this Conference [12]. Therefore I will only present a sample of recent results.

The SUSY paradigm is intensively tested, as already discussed in the flavour sector. First of all both CDF and D0 search for non-SM Higgs. As the SUSY Higgs has a large decay rate in τ pairs, and its production can be enhanced for large $\tan\beta$ both experiments developed a number of τ-ID algorithms to exploit the good S/B ratio of the $H \to \tau\tau$ channel. Dedicated triggers and extensive improvement of algorithms brought up the efficiency for this channel. τ are identified through the detection of their debris in the $\tau \to l + \nu\nu$ and the $\tau \to$ hadronic decay. CDF searched for discrepancy from SM expectations in the visible mass (m_{vis}) distribution, where by m_{vis} we mean the invariant mass of the visible τ decays and the missing E_T. In the region $\simeq 150$ GeV/c^2 a small excess of $\simeq 2\sigma$ is visible in the channel where one of the two taus decays hadronically. Figure 12 where an hypothetic Higgs with mass $M_A = 150$ GeV/c^2 is also superimposed to data. In the corresponding channel in which both τs decay leptonically the search does not have enough statistics to see a possible signal. D0 result does not exhibit a similar enhancement.

Another SUSY sector being tested is through the direct search for for chargino and neutralino which are produced with sizeable cross sections. No signal is observed and therefore limits are set (figure 13).

Despite the large background and the small cross section, performed a search for direct squark and gluino production in a in a sample of events containing large missing transverse energy and three jets. The negative result is converted in a limit in the $M_{squark} - M_{gluino}$ plane (Fig. 14).

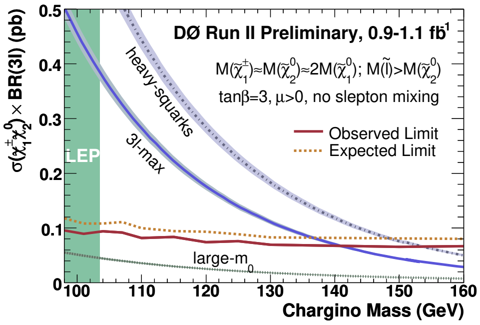

Figure 13: D0

8 Conclusion

With more than 2 fb^{-} already on tape, and the perspective of integrating between 6 and 8 fb^{-1}, the Tevatron experiments are now testing the standard model at its boundaries. The detectors are well understood and the analyses are now mature, therefore the precision study of known processes can be used to measure strcuture functions, test theoretical calculations and challenge measurements performed elsewhere. The measurement of M_W and M_{top} can represent an enduring legacy of the Tevatron well after the LHC starts taking data. The large datasets allow to search for new physics and for the yet undetected Higgs particle which now appears -for some mass ranges- within reach.

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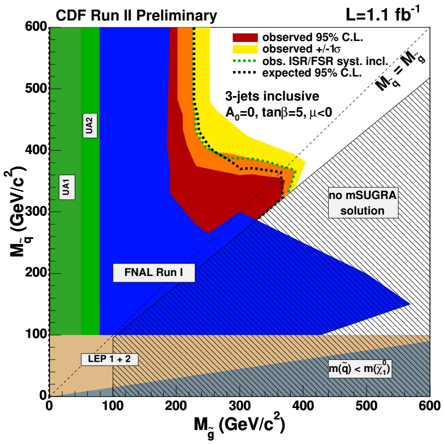

Figure 14: CDF limits in the $M_{Squark} - M_{gluino}$ plane.

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