XLIIIrd RENCONTRES DE MORIOND

Electroweak Interactions and Unified Theories

VII - Summary

WORKSHOP SUMMARY - EXPERIMENTAL

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The experimental results presented at the workshop are summarised and reviewed.

1 Introduction

The 43^{rd} Rencontres de Moriond Electroweak Sessions produced a cornucopia of new results from accelerator and non-accelerator experiments across an impressively wide range, from searches for the Higgs and exotic particles at the Tevatron and HERA to precision electroweak measurements at the flavour factories and fixed target kaon experiments, and new results on neutrino interactions and astroparticle observations. In addition, the prospects for physics at the LHC were discussed.

The talks were excellent, and should be consulted for the details of the results discussed below. References to talks given at the workshop will be indicated by the italicised author, for example *Peach*.

2 Higgs Searches

There were several talks (*Haas, Ochando, Masubuchi, Yorita, Zivkovic*) on the searches for the standard model and non-standard Model Higgs at the Tevatron. So far, between 1 and 2 fb^{-1} of data have been analyzed by CDF and D0, with a total of 3 fb^{-1} each on tape and ready to be analyzed. If the Tevatron continues to run well, there is every prospect that each experiment will have accumulated 6 - 8 fb^{-1} by the end of 2009, and running in 2010 would extend this further.

Although there is not yet any real hint of a signal, there has been remarkable recent progress. As well as the excellent performance of the Tevatron, there have been two particular developments that have improved the prospects for making a discovery. Firstly, the analyses are becoming very sophisticated, increasing the sensitivity from a given data sample. Secondly, combined CDF and D0 analyses are emerging; while this does not improve the statistical significance when compared with combining the two results obtained separately, the consistent treatment of backgrounds, cuts and phenomenological uncertainties should reduce the systematic errors, again improving the significance of the result from a given dataset. The result of this combined

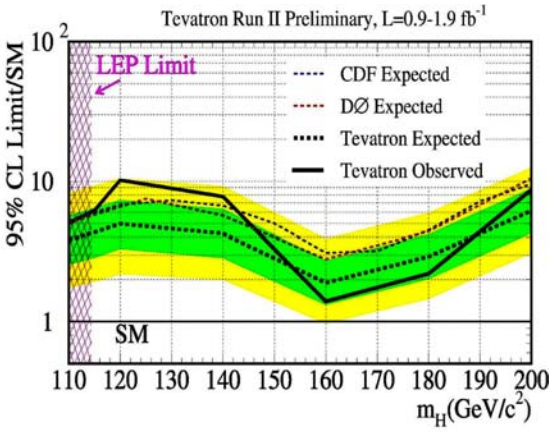

Figure 1: The Standard Model Higgs limit from CDF and D0 combined.

analysis is shown in Figure 1 (*Zivkovic*), where the expected limits from the two experiments separately are also compared with the combined expected limit. The advantages of the combined approach can clearly be seen. There is an opportunity for the Tevatron to place limits on the existence of a Higgs at around 160 GeV/c^2, and perhaps even make a discovery in this region, although it is unlikely that the nature of the Higgs could be firmly established.

Searches for non-Standard Model Higgs continue, but in general the limits are more difficult to interpret because of the large range of parameters that also have to be specified within a given model, as shown in new results presented in Figure 2 (*Haas*).

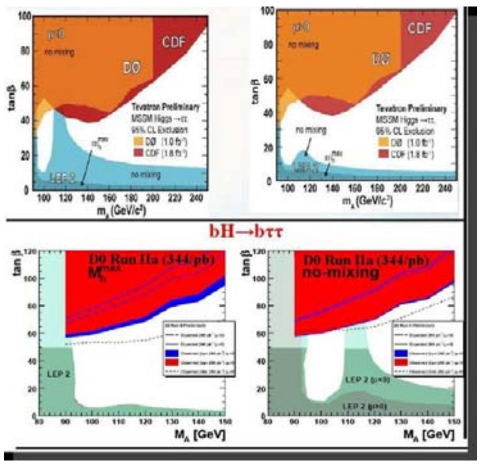

Figure 2: The MSSM Higgs limits in the $H \to \tau\tau$ and $bH \to b\tau\tau$ channels.

3 QCD with Electroweak probes

An important development is the use of electroweak probes (W, Z...) to test QCD. These were reported on by *J Han* and *L Han* for the Tevatron, and by *de Boer* for the HERA experiments. The Tevatron analyses are are particularly important, since they indicate new ways in which the parton distribution functions can be constrained at the LHC. As an example, Figure 3 from *J Han* shows the measured differential cross-sections for Z/γ^* productions as a function of the boson rapidity for D0 and CDF, compared with predictions from MRST NNLO (D0) and CTEQ NLO (CDF) expectations. Likewise, the di-boson production rates can be compared with the

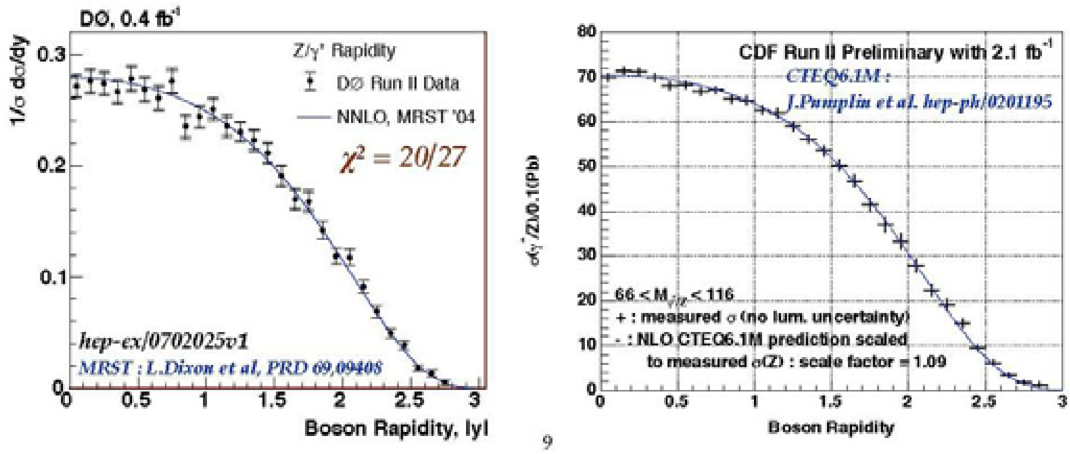

Figure 3: Differential cross-sections for Z/γ^* production as a function of boson rapidity. (left) D0, compared with the MRST-04 NNLO expectation. (right) CDF, compared with CTEQ6.1M NLO expectation.

theoretical expectations to give a sensitive test of the Standard Model calculus (see Figure 4 from *L Han*).

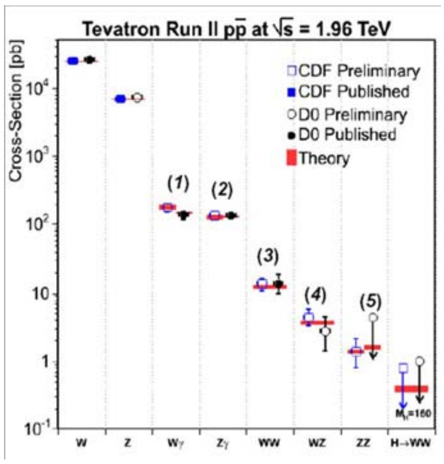

Figure 4: Di-boson (WW,WZ, ZZ, Wγ and —γ) production rates at the Tevatron for CDF and D0, compared with theory. (1) First evidence of Wγ RAZ. (2) Zγ cross-section measurement. (3) $WW/WZ \to l\nu jj$. (4) WWZ Triple Gauge Coupling. (5) First evidence of ZZ.

HERA continues to produce precision tests of our understanding of the proton structure, and the particular features of the *ep* collisions allow tests that cannot be obtained easily from either electron-positron or proton-(anti)proton colliders. As well as checking the chiral structure of the Standard Model, *de Boer* reported on the extraction of limits on the quark radius from high Q^2 neutral current events, placing limits of less than 0.001 times the proton radius (see Figure 5).

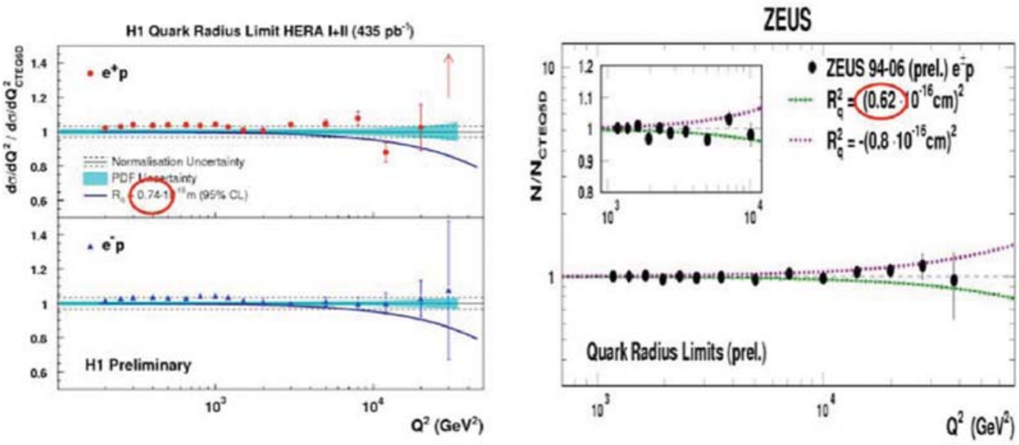

Figure 5: Limits on the quark radius from H1 (left) and ZEUS (right).

4 Searches for SUSY and other new physics

There were excellent reviews of the state of the searches for Supersymmentry and other more exotic extensions to the Standard Model by *Jaffre, Dube, Barbagli* and *Sauvan*, both at the Tevatron and at HERA. So far, despite significant innovation in search strategies and sensitivity to new physics over a wide region of parameter space, no convincing signals have yet been found. While this is, at one level, disappointing it is not particularly surprising. The electroweak fits show that, at the current energy scale, the Standard Model gives an excellent description of the data. Only one of the 18 key measurable quantities ($A^{0,b}_{fb}$) is between two and three standard deviations away from the Standard Model prediction; indeed, without this point, the electroweak fit is if anything *too* good. There are hints of new physics in, for example, the difference between the measured and expected values of the muon $g-2$, but both the experiment and the theory are triumphs of human ingenuity, which is another way of saying that they are very difficult. Finally, it might also be argued that the fact that the best fit value for the Higgs mass is well below the LEP exclusion limit could be a hint that there is new physics somewhere in the domain. However, the main conclusion is that is either no new physics at the electroweak symmetry-breaking scale, or that there is a fortuitous conspiracy of the parameters to keep the new physics hidden at this scale. Whichever of these is the case, it is clear that the energy scale at which the new physics, if it exists, becomes manifest is much higher.

There are two further remarks that I would like to make.

1. It is likely that when (if?) the new physics is found, for example at the LHC, we will discover that there were hints of the new physics in several places, but that lack of understanding prevented it being recognised as such.

2. New model-independent search strategies, using a topological classification of the data and comparing the distribution of many quantities with the Standard Model expectations, should be further developed. Although these methods are not yet as sensitive as the cuts-based search strategies, they have the ability to identify anomalies in the data very quickly. Often, these anomalies will turn out to be due to errors in the Monte Carlo, and indeed this is a very good way to look for such errors. But eventually, it should be possible, once the

Monte Carlo model is sufficiently robust, to use these techniques to look for new physics. A promising example was shown by *Sauvan* (see Figure 6), which compares the H1 data with Standard Model expectations for 23 classes of events with isolated high-P_T leptons, photons, jets or missing energy and up to four other leptons, photons, jets or missing energy for both e^+p and e^-p data, revealing no serious discrepancies, and providing yet another test that could have failed but did not.

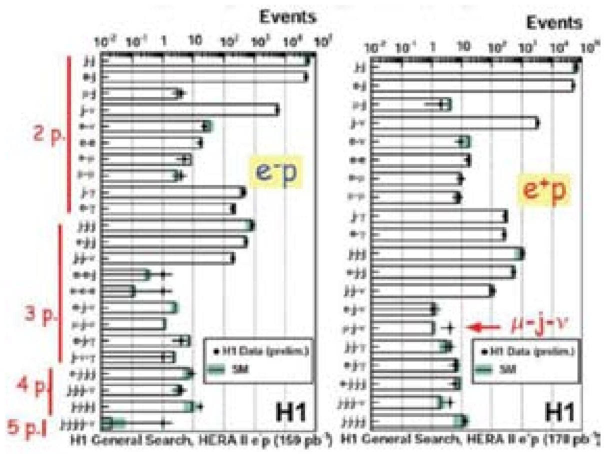

Figure 6: Comparison between H1 $e+p$ and e^-p data and the Standard Model Monte Carlo for 23 different topologies of leptons, photons, jets and missing energy.

5 Heavy Flavour

5.1 Top Physics

Until the LHC begins operating at reasonable luminosity, the Tevatron is the only place where the top can be studied directly.

Besancon discussed the measurement of the top production cross-sections, which can be compared with the expectations from the Standard Model using the measured value of the top mass. Alternatively, assuming that the Standard Model describes the processes, the measured cross-sections can be used to derive a value for the top mass, which can then be compared with the direct measurements. This has been done by both CDF and D0 in the process $t\bar{t} \rightarrow b\bar{b}W^+W^-$ where the pair of W's decay into various combinations of leptons and jets. A new cross-section measurement of $(7.42 \pm 0.53(stat) \pm 0.46(syst) \pm 0.45(theory, m_{top} = 175GeV/c^2))$pb was reported by D0 on 910pb^{-1} of data in the "lepton+jets" channel, where the b-jets were identified either by tagging or topology, in excellent agreement with expectations.

Schwienhorst reported on the single top production, where both CDF and D0 are making measurements in several channels, albeit with large ($\simeq$20%) errors, and D0 reported a promising new approach comparing the $s-$ and $t-$channel production (see Figure 7). *Chen* reported on the direct measurements of the top mass, which is now measured to 1.1% by CDF and D0. An interesting new method was reported (see Figure 8) by *Fedorko* from CDF in the Young Scientists Forum, which uses a coupled channel analysis on the di-lepton and lepton+jets channels, and obtains the single most precise measurement of the top mass, based on 2fb^{-1} of data. A measure of the increasing sophistication of the analyses is shown in Figure 9 from *Chen*, which compares the evolution of the uncertainty in the top mass from CDF as a function of the integrated luminosity to that expected on the basis of the first 680pb^{-1}; the uncertainty on the top mass is reducing faster than would be expected from the increase in statistics, and a precision of 1%

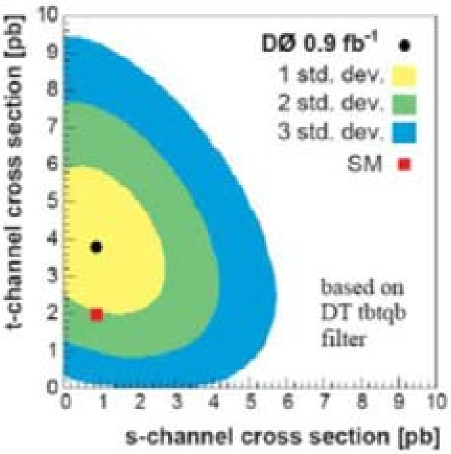

Figure 7: Single top production in the $s-$ and $t-$channel.

on the top mass should be achievable with the presently obtained integrated luminosity. It is equally remarkable that this precision is about a factor two better than the Run-II goal set out in the 1996 TDR. All of these developments are very encouraging for the LHC, which will be,

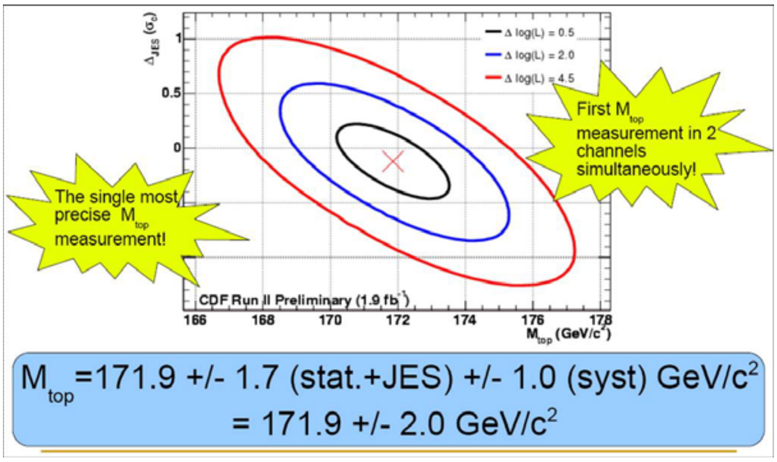

Figure 8: Coupled channel analysis of the top mass from the di-lepton and lepton+jets channels.

amongst other things, a top-factory.

5.2 b, charm and τ Physics

BELLE and BaBar continue to produce a wealth of new results on B-decays. BELLE has accumulated 770fb^{-1} and BaBar has accumulated 510fb^{-1} of data. *Aushev* reported on the time dependent CP violating analyses, where there is mostly good agreement between the various channels which can be used to measure β/ϕ_1. However, a preliminary result from BELLE (see Figure 10) in the channel $B^- \to K_s\pi^0\pi^0$ shows a deviation from the standard model expectations of more than 2 σ. *Liventsev* reported on analyses of $B \to D^{**}\ell\nu$ decays using fully reconstructed B-tags, with the first measurement of the $B \to D_2^*\ell\nu; D_2^* \to D\pi$ decay chain. *Mazur* reviewed the semi-leptonic B and D decays, which are reaching remarkable precision, leading to an impressive precision on V_{ub} (less than 10% error) and V_{cb} (less than 2% error), as well as measuring the b-quark mass to better than 0.7%. *H Kim* reported on the status of leptonic B-decays, including lepton-flavour-violating channels, where there has been recent progress from BELLE, BaBar,

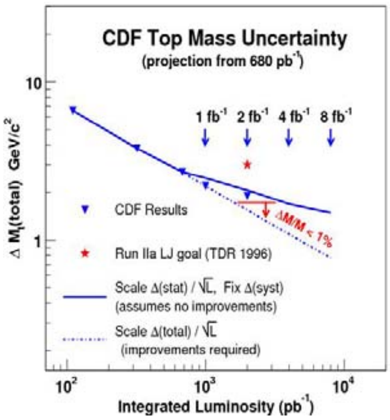

Figure 9: Reduction in the uncertainty in the top-quark mass as a function of the integrated luminosity.

CDF and CLEO, with improvements in the upper limits for $B^0 \to e\mu, e\tau$ and $\mu\tau$ decays (see Figure 11). *Simi* reviewed the status of B-decays via Penguin loops, including the observation of the decay $B \to a_1 K$. *Limosani* reported new results from BELLE on $B \to X_s\gamma$, where heroic efforts have been made to measure the whole of the γ spectrum above about 1.7 GeV; these new measurements are consistent with earlier measurements, but significantly more precise. *Sordini*

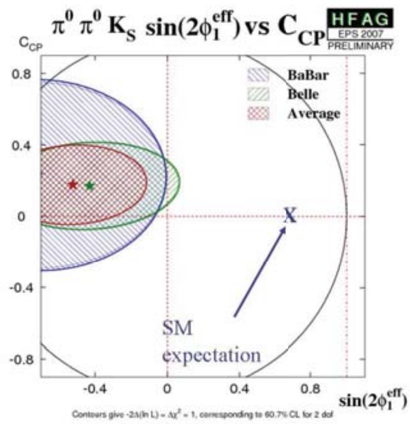

Figure 10: CP-violation parameters from $B^- \to K_s\pi^0\pi^0$ decays.

reported many new results on the angle γ/ϕ_3 of the standard unitarity triangle, demonstrating the remarkable progress that has been made recently (see Figure 12). This, and other recent results, have been used by the CKMFitter group to update their analysis, and this was presented by *Descotes-Genon* (see Figure 13).

Meanwhile, B-physics at the Tevatron continues to make progress, whetting the appetite for the data from LHCb. *Parua* reviewed the status of the lifetime measurements of b-hadrons, including several new results. *Di Giovanni* discussed B_s decays and CP-violation, including the first measurement of $2\beta_s$. In the Standard Model, CP-violation is expected to be small in the B_s system ($2\beta_s = (0.04 \pm 0.01)rad$), but the measurement by D0, consistent with the constraint from CDF, is more than 2 σ away from the Standard Model expectations

CLEO-c (*Park*) and BES (*Ho*) are producing a plethora of results on charm and τ physics, with results on branching fractions and new charm states being reviewed, and on precision measurements of the hadronic cross-sections in the charm region. *Xu* reported on several new

BaBar, CDF, Belle, CLEO

Mode	# $B\bar{B}$ events	UL @ 90% CL	Prev. Best UL
$B^0 \to e^+e^-$	384 M	11.3×10^{-8}	6.1×10^{-8}
$B^0 \to \mu^+\mu^-$		5.2×10^{-8}	1.8×10^{-8}
$B^0 \to e^+\mu^-$		9.2×10^{-8}	18×10^{-8}
$B^+ \to e^+\nu$	378 M	5.2×10^{-6}	9.8×10^{-7}
$B^+ \to \mu^+\nu$		5.6×10^{-6}	1.7×10^{-6}
$B^0 \to e^+\tau^-$		2.8×10^{-5}	1.4×10^{-4}
$B^0 \to \mu^+\tau^-$		2.2×10^{-5}	3.8×10^{-5}
$B^+ \to K^+\nu\bar{\nu}$	351 M	4.2×10^{-5}	1.4×10^{-5}

Figure 11: Summary of the data on leptonic B-decays.

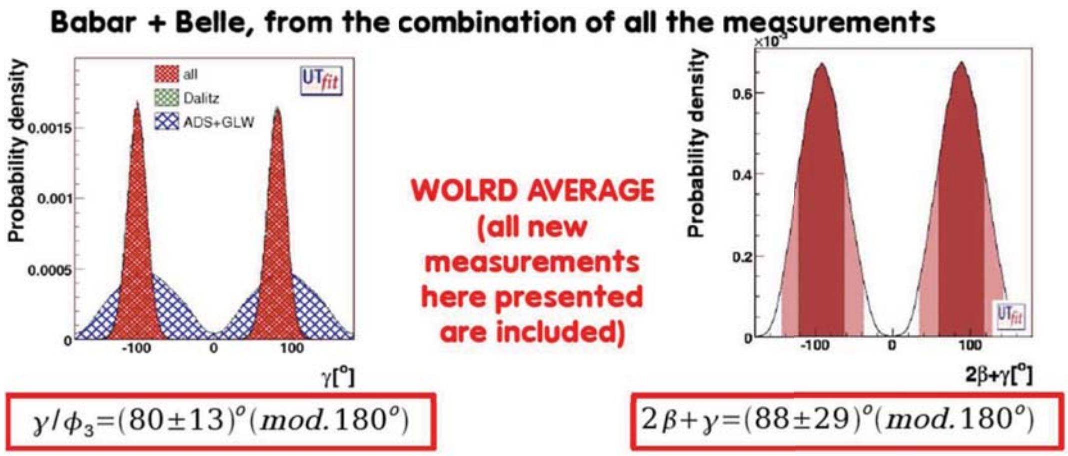

Figure 12: New combined BELLE and BaBar measurements of γ/ϕ_3.

charm states seen by BES, as well as updates on many previously discovered states. BELLE and BaBar also produce copious numbers of charmed particles and τ laptons, as reviewed by *Zupanc*.

During the workshop, the UT-fit collaboration produced an analysis [1] of all the data on the $b \to s$ transition, claiming evidence for new physics at greater than 3σ. They parametrise the new physics (A_s^{NP}) relative to the standard model (A_s^{SM}) as

$$C_{Bs}e^{2i\phi_{Bs}} = \left(A_s^{SM}e^{-2i\beta_s} + A_s^{NP}e^{2i(\phi_s^{NP}-\beta_s)}\right)/A_s^{SM}e^{-2i\beta_s}$$

so that the "no new physics" scenario has $C_{Bs} = 1$ and $\phi_{Bs} = 0$. The results of the analysis are shown in in Figure 15. While C_{Bs} is consistent with the Standard Model, the phase ϕ_{Bs} seems to be inconsistent with the Standard Model expectations, at a level with greater than 3σ significance. While this is intriguing, more evidence is probably required before a strong claim for new physics can be convincingly made. In particular, it implies that the amplitude for the new physics is comparable to the Standard Model amplitude, which (if true) makes it perhaps surprising that this has not already revealed itself elsewhere.

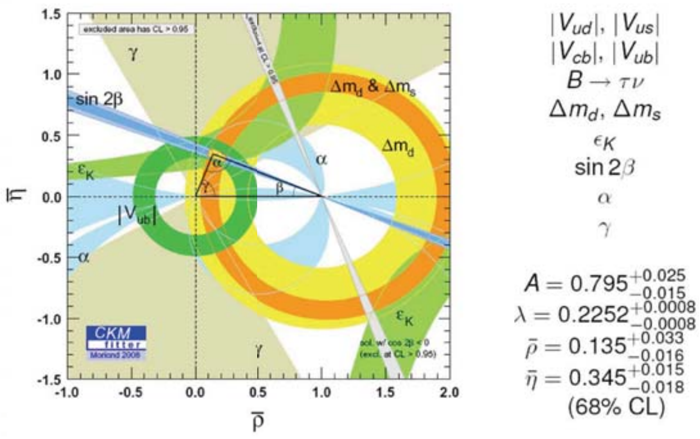

Figure 13: The updated fit to the available experimental data for the CKM parameters from the CKMFitter collaboration.

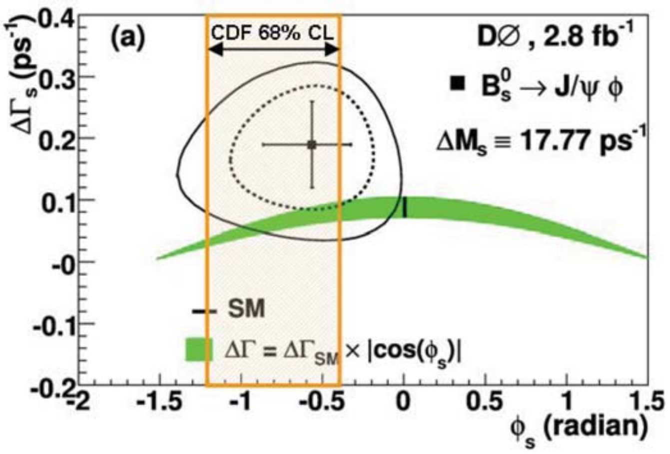

Figure 14: Plot of ϕ_s=$-2\beta_s$ versus $\Delta\Gamma$ from D0, together with the limits on ϕ_s from CDF, showing a clear discrepancy with the Standard Model expectations.

6 Kaon Physics

Although it is more than 60 years since the kaon was first observed in cosmic rays by Rochester and Butler, there is still much to be understood, and thanks to the heroic efforts of NA48, KTeV and KLOE, there has been a significant improvement in the measurement of some rather basic parameters. Recent measurements reported by *Ruggiero* (NA48) and *Testa* (KLOE) on the $K_{\ell 2}$ and $K_{\ell 3}$ decay modes improve significantly on the precision of earlier measurements, and lead to tighter constraints on the unitarity of the CKM matrix, particularly through better determination of V_{us}, and place new limits on lepton flavour violation. *Glazov* (KTeV) reported an update on the value of ϵ'/ϵ, with a new world average of $(16.4 \pm 1.4) \times 10^{-4}$. Perahps more importantly, there is now good agreement (see Figure 16) between NA48 and KTeV. In addition, *Archilli* (KTeV) reported an new upper limit on the important branching ratio $K_S \to e^+e^-$ of 9.3×10^{-9} at 90% confidence level, an order of magnitude smaller than previous measurements. Finally, *Zimmerman* reported on a new measurement by KTeV of the π^0 double Dalitz decay, the first such measurement in more than 47 years. The result of $(3.26 \pm 0.30) \times 10^{-5}$, based on 30.5k events, is fully consistent with the 1960 measurement based on only 112 events.

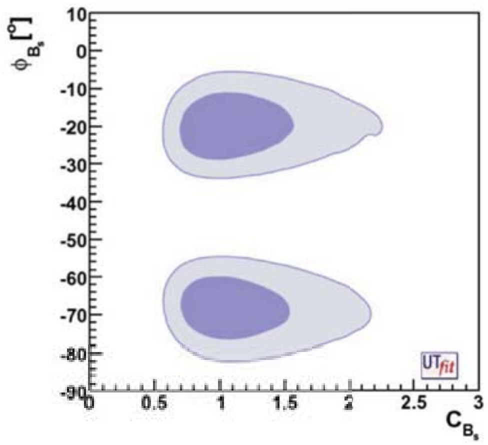

Figure 15: The 68% (dark) and 95% (light) probability regions in the $\phi_{Bs}C_{Bs}$ plane.

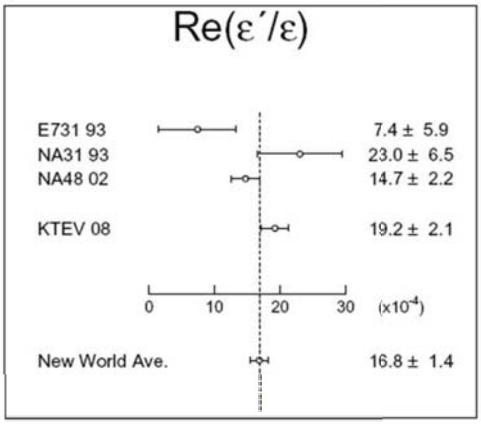

Figure 16: Recent measurements of ϵ'/ϵ.

7 Neutrino Physics

Although not neutrino physics, it is very important for the oscillation experiments to have a good understanding of the hadron production differential cross-sections for the particular incident proton energy and target configuration. This is important for both the present generation of experiments (K2K, MINOS, MiniBooNE) and future experiments such as T2K and a possible neutrino factory or superbeam facility. The HARP experiment has taken data at many proton energies and with a variety of targets, and new results were reported by *Tsenov*. These data are also important for calculations of the atmospheric neutrino fluxes.

The low energy neutrino and antineutrino cross-sections, which are still relatively poorly known, are a significant source of systematic error. New results on the low-energy quasi-elastic and NC π^0 production were reported by *Katori*, and there are new experiments (SciBooNE and Minerva) under way to measure these low energy cross-sections.

7.1 Neutrino Oscillations

Pistillo reported on the status of the OPERA experiment at Gran Sasso, in the CNGS neutrino beam from CERN, where 38 events have already been observed. *Habig* gave an update to the MINOS results with $|\Delta m^2_{32}| = (2.38^{+0.20}_{-0.16}) \times 10^{-3} eV^2$ and $\sin^2 2\theta_{23} = 1.00_{-.08}$, with a fit χ^2

of 41.2 for 34 degrees of freedom (see Figure 17). *Polly* reported on the latest status of the MiniBooNE analysis, which now includes data from 250 MeV to 300 MeV. The excess of events below 500 MeV is still there, and at the lower energy, but is not compatible with neutrino oscillations. In an attempt to understand even better the detector and the data, the electron- and muon-like events seen in MiniBooNE from the NUMI beam line have been analysed, and preliminary results are in good agreement with the expectations.

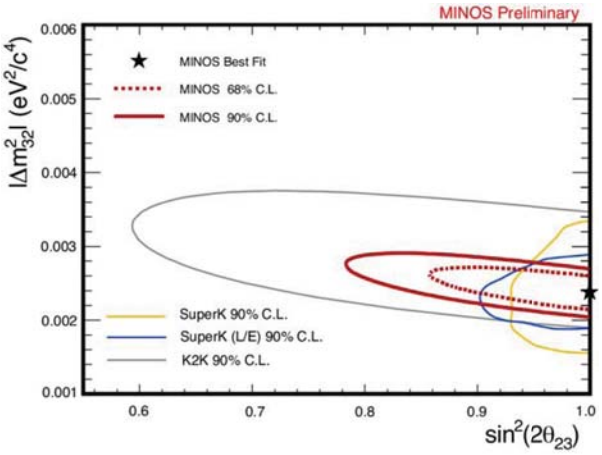

Figure 17: The latest results from MINOS on $|\Delta m^2_{32}|$ and $\sin^2 2\theta_{23}$.

Finally, *Dalnoki-Veress* reported on the first published result from Borexino, which has detected the ^{7}Be solar neutrinos at a rate consistent with the LMA MSW solution for neutrino oscillations, albeit with a relatively large systematic error. This is, nevertheless, an important measurement since it studies these low energy solar neutrinos in real time.

7.2 Neutrinoless double β decay

Although the observation of neutrino oscillations establishes beyond doubt that at least two of the neutrino have a finite mass, it does not set the absolute mass-scale. Direct measurement of the electron neutrino mass is challenging, and the KATRIN experiment is rising to that challenge, but will be limited to an absolute neutrino mass scale of a few hundred meV. There are constraints from cosmology, since the neutrino mass has an influence on the way the early universe unfolds. However, in my view, the neutrino mass-scale should be an input to cosmology. Provided that neutrinos have a Majorana component, the rate of neutrinoless double β decay is proportional to a weighted average neutrino mass, and thus, when combined with the two independent mass-differences squared, sets the absolute neutrino mass scale. *Vignati* (CUORICINO) and *Broudin-Bay* (NEMO-3) reported new results on the search for neutrinoless double β decay. CUORICINO reported a new preliminay result based on 15.53 kg-years of data on ^{130}Te yields a limit (90% confidence level) of 3.1×10^{21}y, which translates to a limit on the the weighted average neutrino mass $m_{\beta\beta}$ of between 0.20 eV and 0.68 eV, where the uncertainty depends upon uncertainties in the nuclear matrix elements. NEMO-3 reported a new preliminary limit of 1.46×10^{22} for ^{150}Nd, almost an order of magnitude higher than the best previous limit, corresponding to a limit on $m_{\beta\beta}$ of between 3.7 eV and 5.1 eV.

8 Dark Matter

There were several talks on Dark Matter experiments. Perhaps the most imaginative development, in my opinion, is the COUPP (Chicagoland Observatory for Underground Particle

Physics) experiment in the MINOS near detector hall at Fermilab, reported by *Szydagis*. This uses the (very old) Heavy Liquid Bubble Chamber technique in a novel way, by deliberately desensitizing the superheated liquid so that minimum ionising particle leave no trace, and holding the liquid in a metastable phase for long enough to act as a WIMP detector. Its first result is an impressive limit compared with previous measurements (see Figure 18), incompatible with the DAMA-allowed [a] region. *Lang* reported on a new result from the CRESST experiment, which

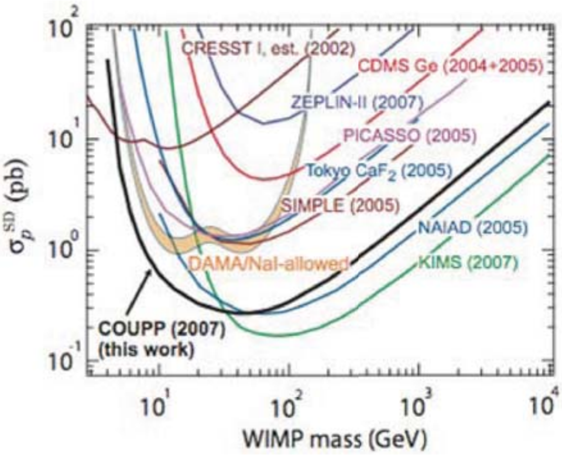

Figure 18: The first results from COUPP on the search for Dark Matter.

is not yet competitive with CDMS, but is very promising since the analysis is based on only 67 kg-d of data taking. *S-K Kim* reported on the KIMS Dark Matter experiment, which uses CsI as the target and detector and so is more directly comparable with the DAMA NaI data; their results are incompatible with the DAMA claims of a signal for spin-independent interactions, and are incompatible with the DAMA limits for spin-dependent interactions for WIMP masses above 20 GeV/c^2. *Santorelli* reported on the status of the XENON experiment, with a recent spin-independent limit comparable to the latest CDMS limit (see Figure 19) Finally, *Ahlen* discussed the options for a large, affordable gaseous TPC which could be used as a directional Dark Matter detector.

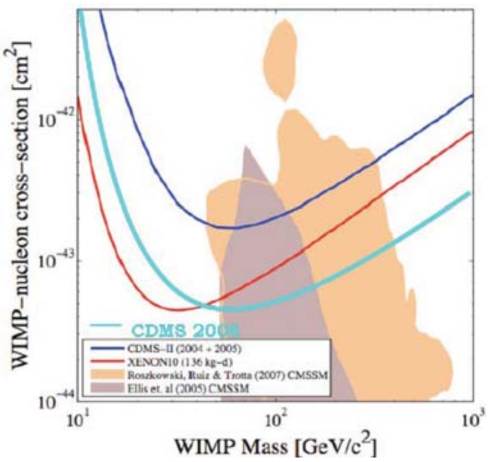

Figure 19: Recent on spin-independent limits from the XENON Dark Matter experiment.

[a] This workshop took place before the most recent result from DAMA, making stronger claims for a Dark Matter signal based on significantly more data; the experiments reported here are also inconsistent with this recent DAMA result (see arXiv:0804.2741v1 (astro-ph)).

9 Astroparticle Physics

The past decade has seen a dramatic growth in the field of Astroparticle Physics (or Particle Astrophysics). Many of these experiments use particle physics techniques to explore astrophysical objects, using particles (other than light) as messengers. These experiments explore the Universe in a new way, and could reveal many new and unexpected phenomena. However, these experiments also have the potential to reveal new features in particle physics.

Glicenstein reported on the high energy gamma ray experiments (HESS, MAGIC, Whipple) and the prospects for GLAST (2008))and upgrades to MAGIC (2008) and HESS (2009). These experiments are sensitive in some models to Dark Matter through the annihilation processes in the galactic centre, and can yield interesting bounds on the scale of quantum gravity. *Roucelle* reported on the status of the AMANDA and ICE-CUBE experiments, looking for point sources of neutrinos, so far without success, and *Pradier* reported on the status of ANTARES, which is beginning to see candidate neutrino interactions.

The CAST experiment at CERN, recycling a prototype LHC dipole magnet, is looking for evidence for axions from the sun via the inverse Primakoff effect, and is beginning to achieve sensitivities that will constrain the models, as reported by *Borghi*.

There were two reports from the AUGER experiment, where *Maris* reported on the spectrum of ultra-high-energy cosmic rays (UHECR) and the evidence for the GZK cutoff, and on the evidence that their composition has several components. *Bonino* reported on the evidence for anisotropies and correlations with known astrophysical objects for these ultra-high-energy cosmic rays, although there was a comment by *Tinyakov* that the statistical significance may be less than claimed. *Arqueros* presented a review of methods of calculating the air flourescence yield from UHECR, emphasing the progress that had been made but also the fact that there were still some discrepancies and model dependencies despite general agreement, so that the absolute values have an uncertainty of about 10%.

10 The LHC machine and experiments

Of course, many of the unresolved issues discussed above - the existence and mass of the Higgs and any low-lying Supersymmetry, Dark Matter, flavour physics etc - should be greatly illuminated by the data from the LHC. *Evans* gave a report on the status of the LHC machine, where the final cool-down was well under way. At the time of the meeting, about half of the machine was cold or in the process of cooling down, although one of the sectors would be warmed up to complete the repair of the inner triplets. The schedule (see Figure 20) should see the machine cold and ready for beam in July, provided that there is no unforeseen reason to warm up one of the other sectors. *Plamondon* and *Christiansen* reported on the state of readiness of the ATLAS and CMS detectors, and demonstrated that both experiments are ready to extract the first physics once collisions are achieved, and *Tsuno* and *Bellan* showed that the Higgs and any exotic physics would be clearly seen.

The next two or three years are going to be very exciting. The Higgs (if it exists), or the mechanism that so closely mimics (it if it does not), will be revealed at last and its nature explored. We can also hope that some of the many new phenomena (some more exotic than others) that could begin to address some of the unexplained features of the Standard Model may be discovered, probably sooner rather than later. Of course, we may find little new, but I would be both surprised and disappointed if that were the case - the Standard Model, while an excellent description of physics at the electroweak scale, is clearly only an effective theory. We need the LHC to illuminate the road ahead, towards a more fundamental and more satisfying description of the universe around us.

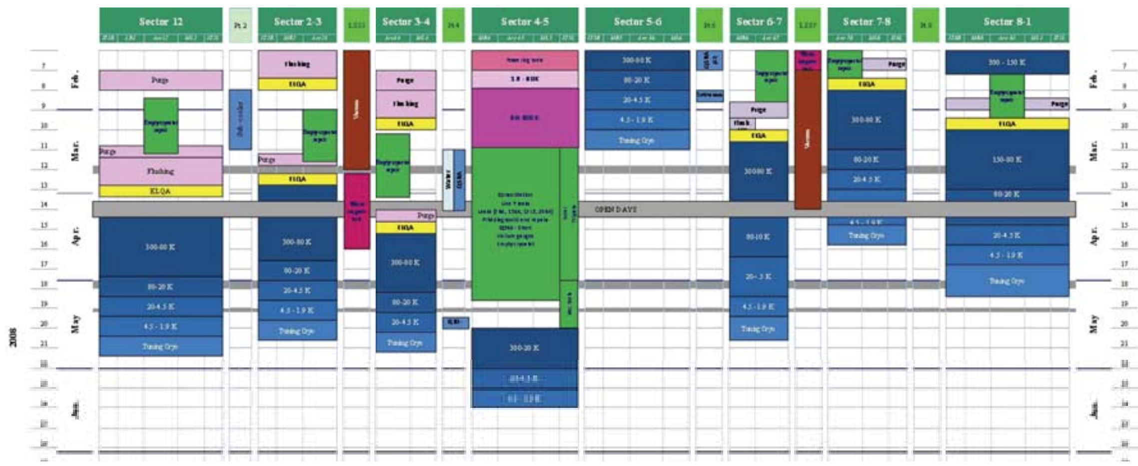

Figure 20: The LHC cooldown schedule.

11 Summary and Conclusion

The Rencontres de Moriond Electroweak Sessions provide an opportunity to review and discuss the state of the Standard Model description of the atto-world, and this year has seen the presentation of many new results. Most confirm that the Standard Model is an excellent description of the interactions up to the electroweak unification scale. There are a few results which challenge the Standard Model, but these are still at the level of "hints" of, rather than solid evidence for, new physics. There is, however, a feeling "in the air" that new physics is just around the corner - at the Tevatron, the flavour factories, fixed-target or non-accelerator experiments and, if not found there, at the LHC. The next few years should be very exciting, and should reveal the physics that underpins the Standard Model.

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References

1. M. Bona *et al.* (UTfit Collaboration), "First Evidence of New Physics in $b \to s$ Transitions," arXiv:0803.0659 (hep-ph)