

## Electroweak Heavy Flavour Minutes 24-2-94

### 1. J-P Lees - Electrons in 1992 and 1993

Jean-Pierre presented a very comprehensive review of the status of the electron estimators for the 1992 data and new 1992 Monte Carlo and also preliminary results on 1993 data. No significant differences between 1992 and 1993 data were found. The ECAL estimators were in general found to be in good shape with simple corrections required to correct between data and Monte Carlo. Some discrepancies between positrons and electrons were found in the end caps as a function of momentum; the former are corrected by better calibration; the latter are believed due to a tracking problem and remain a small problem. More discrepancies were found between data and Monte Carlo when the identification requires the  $R_I$  estimator and greater than 50 samples. Correction factors then need to be functions of  $p$ ,  $p_t$  and  $\cos\theta$ .

Jean-Pierre also reported on a preliminary investigation of the background to the electron sample from hadrons. He has employed both fits to the  $R_I$  distribution as in the past and also fits to the  $R_T$  distribution following  $R_I$  and  $R_L$  cuts. First results suggest the background estimates are higher when the  $R_T$  fits are used - this is not seen in the Monte Carlo. This work proceeds.

### 2. P Perret - Electron Identification

Pascal complemented the talk he gave at the February plenary meeting with results for the 1993 data compared to the latest 1992 Monte Carlo. Conclusions were very similar to those of Jean-Pierre; his plots gave greater emphasis to the overlap region between barrel and end-cap but showed that the correction factors in this region were no greater than over the remainder of the calorimeter.

### 3. E Martin - Flavour Composition of our Leptons

Elizabeth expressed concern that the purity of the  $b$ 's in the lepton sample following a  $p_t$  cut of 1.25 GeV/c was 88% from the Monte Carlo and only  $84\pm 1\%$  when QIBTAG is used to measure it. This has significant consequences for approaches which use the lepton sample to calibrate the  $b$ -purity.

To investigate the problem she has isolated three samples of lepton events by cutting on combinations of event shape and lifetime tags to yield a) a B-sample with 98%  $b$ 's, b) a charm sample with 80%  $c$  and 20%  $uds$  after subtracting the  $b$ -component and c) a  $uds$  sample with 40%  $c$  and 60%  $uds$  after subtracting the  $b$ -component. With these samples she can rebuild the full lepton  $p_t$  spectrum which agrees well with the MC one - as does the spectrum from the  $b$ 's alone. However if she takes the full measured lepton spectrum and uses the B sample to give the purity a discrepancy is observed which is not present in the MC. Examination of the extracted spectrum of the leptons from charm and  $uds$  both reveal discrepancies between data and Monte Carlo; this is seen most clearly in an integrated  $p_t$  spectrum for  $c+uds$  for both muons and electrons where there is a discrepancy at high  $p_t$  with more candidates in data than MC. This yields the discrepancy in the purity which commenced the investigation. The origin of this is not understood and will be the subject of further study.

#### **4. R Tenchini - Mu-id 1993**

Roberto reported on the work of A Antonelli, A Gregoric, G Taylor and A Venturi on the efficiency mapping for the 1993 data. With the exception of a few chambers which have experienced high voltage problems the results are compatible with those from 1992.

#### **5. S Monteil - Measurement of the Quantities linked to Muon Identification.**

Using  $Z \rightarrow \mu^+\mu^-$  and  $\tau \rightarrow \mu\nu\nu$  Stephan has compared the muon efficiency in the 1993 data with both 1992 data and the latest corrected 1992 Monte Carlo. No significant differences are seen. He also investigated the misidentification of pions as muons by examination of hadronic  $\tau$  decays and  $K^0$  decays. All methods yield data/MC misidentification ratios of  $\sim 1.2$  which is consistent with previous measurements.

#### **6. F Ligabue - b Mixing and Asymmetry**

Franco reported the latest results on Mixing and Asymmetry using high  $p_t$  leptons from 1990-1993 data. The analysis basically follows the pattern of the lepton paper on 90 and 91 data but with some small changes introduced to take advantage of the higher statistics now available and to harmonise the analysis with suggestions from the LEP electroweak working group. The most significant changes were to take the background charge correlation for mixing from the data as a function of  $p_t$ , and to measure the background from data for the asymmetry. The asymmetry analysis was also changed by the introduction of a free coefficient for the  $\cos^2\theta$  term in the fit to the angular distribution. To accommodate the LEP working group's wishes the charm asymmetry was no longer related directly to the b asymmetry but included explicitly. For the Monte Carlo the  $b \rightarrow c \rightarrow l$  spectrum was weighted to reproduce the CLEO  $b \rightarrow D$  spectrum folded with the DELCO  $c \rightarrow l$  spectrum and branching ratios were taken from LEP averages rather than the ALEPH global fit. Preliminary results are presented on the transparencies.

#### **7. D Abbaneo - (New) Technicalities for High $p_t$ Lepton Measurements.**

Duccio reported on the prescriptions which have been advocated by the LEP electroweak working group for modelling the  $c \rightarrow l$  and  $b \rightarrow c \rightarrow l$  spectra. Whilst the  $c \rightarrow l$  suggestion, an ACCMM fit to the DELCO + MARKIII data is very close to that adopted in the ALEPH lepton paper the procedure for  $b \rightarrow c \rightarrow l$  which uses a Petersen function to fit the CLEO published  $b \rightarrow D$  spectrum followed by the  $c \rightarrow l$  prescription would appear to be a distinct improvement. Suggestions for the  $b \rightarrow l$  spectrum were also discussed. Details are available from the transparencies and the note from the working group.

Secondly Duccio continued his work on pion misidentification using hadronic  $\tau$  and  $K^0$  decays. His result for the data/MC ratio for pion misidentification of  $1.23 \pm 0.16$  is in agreement with previous results and those from Stephan.

Finally he has investigated the effect of the 'sagitta corrections' to see if they could give problems in the determination of the asymmetry, particularly in view of the +/- differences for the ECAL estimators in the end caps. Over the range of momenta and angles of the leptons used for the asymmetry measurements no effect is remotely visible.

## **8. D Brown - $R_b$ with Lifetime Tag - Status Report**

Dave gave a first report on his attempt to extend his  $R_b$  analysis to the 1993 data with the latest Monte Carlo. Difficulties have appeared; his event selection for the analysis has an efficiency of 62.3% compared with 57.5% in 1992. The tracking in the latest Monte Carlo would appear to be too good and at present the contribution to the error of the charm efficiency is substantially greater than in 1992; this actually leads to an overall greater error on  $R_b$ . However there is much still to be investigated but there will be no update for the winter conferences.

## **9. F Saadi - Measurement of $R_b$ with hemisphere Double Tag Methods**

Fouzia reported work at Clermont-Ferand on four double tag methods. These are a) single and double tag leptons with 92 data, b) event shape and leptons (an update with 92 data to published results), c) event shape and lifetime tag with 92 data and d) lifetime and leptons with 92 data.

Combining the results from all four methods overall statistical and systematic errors of about 1% each were claimed. Given the previous concerns over the high  $p_t$  lepton purity and the absolute importance of a full understanding of the systematics when approaching the 1% level for  $R_b$  it was decided that it would not be appropriate to present these results to the winter conferences but wait until there had been further investigation of possible systematics and discussion within the collaboration.

## **10. R Tenchini - The LEP Eweak HF Working Group Recommendations**

Roberto outlined the work and aims of this group. The basic motivation is to enable realistic averaging procedures to be adopted, particularly as far as modelling of the important spectra are concerned. This can enable a common procedure to be adopted for defining systematic errors from lack of knowledge of the underlying physics.. These recommendations are now in a written document. Roberto showed the justifications and the results of various fits which the group suggest should be adopted.

## **11. I De Bonis - Measurement of the B fragmentation function**

Isabel reported a new analysis to measure the mean value and shape of the B fragmentation function in a model independent way using the exclusive decay mode  $B \rightarrow D^*lv$ . The  $\nu$  energy is estimated from the hemisphere missing energy with the energy flow package. She obtained  $\langle x_b \rangle = 0.695 \pm 0.017$  and a shape which was marginally harder than a Petersen one which would reproduce this value. Very preliminary results using the decay  $B \rightarrow Dlv$  were also given. It was felt that this analysis was a significant advance and should be presented to the collaboration for the winter conferences.

## **12. A Halley - Measurement of $A_{FB}(b)$ using jet charge**

Andy updated his previous results with the 1993 data. All checks show no significant discrepancy with his earlier 1992 results except that the lepton check had not yet been applied, however this does not significantly degrade the final result. As the 1993 data has significant samples of events at the off-peak points the energy dependence of the asymmetry can now be meaningfully measured and Andy was encouraged to include this in the paper soon to be distributed even if the lepton check could not be included yet.