Minutes of the 111th Energy Calibration Meeting held on 22 November 1996

1 NMR numbering convention

We agreed in the meeting to stick from now on to the convention for NMR numbering that is in the database, so that the probes in the tunnel in 1995 are NMR4 and NMR8, and the chains of dipoles are in octants 1 and 5. This is offset by 1 from the usual LEP octant numbering system, but will hopefully minimise uncertainty within the energy group.

2 NMR data at 161 GeV

Paul Bright-Thomas has looked at the NMR data from the 161 GeV running. The rise in a fill is seen in each octant, and the quiet period without trains is clearly visible. Probes 1, 7 and 8 show behaviour with more jumps and noise compared to the steady rise in octants 2–6. The correlations in noise between octants has been studied. The noise is strongly anti-correlated between opposite octants (large negative correlation coefficient) and yet next door neighbour octants do not show such a strong positive correlation. This is not completely understood. The multiplexed readout in octants 1 and 5 may explain some of the differences, because they are effectively sampling at a different frequency to the others.

3 Temperature coefficients

Mike Koratzinos reminded us how he determined the effective temperature coefficients of NMR4 and NMR8, by plotting deltaB/B vs delta T in the quiet period. There is no evidence that the temperature coefficients are different for T rising and T falling within the large error bars.

The ring temperature coefficient was determined from the fill 1772 (temperature experiment in 1993) with an accuracy of about 60%.

The question of why CTring is not equal to CTNMR48 can be examined with the 1996 data, where it is seen that the spread of temperature coefficients is broad and NMR8 is not typical.

Mike has also looked at the 1996 data. There is some question of the true precision of the temperature probes, which tend to step between values with a slope in between.

4 1996 Extrapolation Error

Mike Koratzinos presented an update of his examination of the extrapolation in the polarisation fill 3719 with data at peak-2 and 50GeV compared with the NMR data.

The advantage of using the NMR's is that they are read out during the fill, while the flux loop evaluation is performed separately. The analysis has now been made using an average of 8 NMR's round the ring, instead of just NMR48. The average of the 8 NMR's reproduces the rise between peak-2 and 50 to less than or about 1MeV.

A figure prepared by Joerg Wenninger comparing NMR data with the flux loop for those NMR's working over the range from 44 GeV upwards was also shown. There is a scatter of at most about 10 MeV between the NMR energies and flux loop energy. (These measurements are taken from a special flux loop calibration with a longer than usual pause at each energy step to give time for the NMR's to lock and be read out.)

5 Z fills in 1995 and 1996

Angelika Drees has continued to check the "Enrico" temperature model for fills without bend modulation in 1995 and Z fills in 1996, for NMR4 and NMR8. The Enrico model is able to describe the full rise seen in NMR4, but does not agree for NMR8.

6 NMR/Temperature studies with 172 GeV data

Guy Wilkinson showed work on behalf of G.W., Pete Renton and Kin Yip. The examination of temperature coefficients in the 1996 data has been updated using the 172 GeV data. The advantages are that a larger fraction of the probes are available, the logging is more reliable and there are larger temperature excursions (around 0.1 degrees/hour). As in other data, probes 1,7 and 8 are jumpy, and probe 4 shows a larger rise in the fill. Rises in the quiet period are assumed to be temperature driven.

Fits to the first 8 hours of a fill for positive temperature changes have been caried out. In this case the Enrico model is equivalent to the "classical" model with one effective temperature coefficient (CTmax + CT). The 161 and 172 data have been fit separately and together, using all times of day or just the quiet period, varying the time interval over which delta T is evaluated and varying the cuts applied to suppress jumps. Consistent results emerge from most of the fits although the "jumpy" octants are more sensitive to the details, making it difficult to evaluate a coefficient especially for octant 8. The most reliable results come from the fits in the quiet period. (One constant per NMR is plotted, i.e. multiple entries for the dipole strings in 1 and 5). The average over the octants gives a result consistent with the value of CTring of 10*10-5. (Fit gives 9.3 +- 0.4 * 10-5). NMR4 has a value of CT greater than the average, and NMR8 is difficult to measure, but always gives a positive coefficient (in contrast to MTG fits to 1995 data). The NMR48 combination turns out to be similar to the ring average, not 0.25 of the ring average as used before.

Further systematic studies are in progress to calculate the mean energies for 1993 and 1995 using the full Enrico model and comparing with the classical model. Shifts in Ebeam of 0.3 MeV at peak-2 and 0.4 MeV at peak+2 have been evaluated in a preliminary study.

7 Status of 1996 analysis

For the analysis of 1996 data, it is proposed simply to histogram the rise as a function of time of day and time of fill using all the available NMRs, to give the average behaviour, rather than fitting a dipole model to a functional form. The relative importance of train and temperature effects does not need to be unfolded. A skeleton structure is in place to produce energy files for the 161 and 172GeV running. The near future will bring an attempt to measure polarisation at 55GeV and a temperature experiment without beam before the ring is opened (to be arranged in between SL/COntrols group work). We still hope to be able to provide numbers for the 1996 energies before the end of the year, but time is short!

8 Next Meeting

It has been proposed to meet every week from now until the end of the year. The next meeting will be at 14:00 on Friday 29 November in the pavillon.

Pippa Wells, 26 November 1996.