# Minutes of the 221st Energy Calibration Meeting held on 18 October 2002

**Present:** Bernd Dehning, Pete Renton (by phone), Guy Wilkinson

Since the last meeting there has been progress on many of the questions which need to be resolved for the paper. However, no new draft has yet been prepared.

## 1 Flux loop

Pete has devised a new method for assigning the flux loop uncertainty which has the advantage of being based on data analysis, rather than conjecture. A plot is attached to the minutes which illustrates the principle.

A fit is made to the flux loop data in the interval 41-55 GeV, and the results used to make an estimate of $E_b$ at 60 GeV. (This is exactly the same procedure used in the standard flux loop analysis, but there the fit is made over 41-60 GeV and the result used to make an estimate of $E_b$ at $\sim$ 100 GeV.) An analogous fit is made to all of the RDP data, again in the 41-55 GeV range, and the resulting model residual calculated for the data at 60 GeV. The difference between the flux loop vs NMR and the RDP vs NMR residuals at 60 GeV gives a measure of the flux loop extrapolation error from 48 GeV to 60 GeV. This error may then be scaled up to account for the extrapolation to physics energy.

A preliminary application of this method gives an error at high energy of 13 MeV. Together with the error of 6 MeV from the field not sampled by the flux loop, a total uncertainty of 14 MeV is obtained.

Pete will repeat the analysis when the final NMR fit coefficients are available.

## 2 Energy Files

Guy is rechecking the energy files of all the LEP2 data sets. At present he has looked at 1997,1998 and 1999, and for each produced new 'final' files (and NMR fit coefficients). There are small, but non-negligible changes with respect to the preliminary files.

This work should be finished within a couple of weeks. The files will then be announced to the experiments, together with the information that a further offset will be given at a later date (most likely the New Year). The experiments may then decide how they wish to apply these.

# 3 Spectrometer Analysis

The draft paper has a complete error analysis for the spectrometer, apart from one term, that concerned with the bias coming from the BPM response to changes in beam spot sizes. There has been work invested into investigating this effect, which is detailed in the transparencies. It is necessary to know 3 items:

1. The bias coming from a beam spot of a given size at a given BPM offset – this has been provided by John Matheson.

2. The correspondence between the LEP frame and the BPM frame, and the deviation from 'LEP x=0' of the spectrometer measurements. This has been estimated from logged orbits excavated by Jorg.

3. The alignment of the BPMs with respect to their nominal positions. Bernd has looked at the results of various surveys conducted in 2000. The alignment was good – values are available for each BPM, and the RMS of the misalignment over all 6 BPMs is less than 150 $\mu m$.

After the meeting Guy took this information and simulated spectrometer measurements with the known average beam trajectory of the 2000 data, and the measured BPM misalignments. $E_b$ biases were obtained for both polarisation and physics optics, accompanied by small triplet residual shifts of $\leq 1\mu$m, which meant that the biases varied with the various BPM combinations used in the fit. In practice the procedure used to globally fit the data set, as detailed in the draft, would suppress these differences and dilute the effect. For the purposes of the error assignment, however, the bias seen for the 'span' combination averaged over the two optics can be used to characterize the uncertainty. This gives a value of $4 \times 10^{-5}$.

# 4 Next meeting & Next Draft

Late November – precise date to be decided.

Guy Wilkinson, 18 October 2002.