Minutes of the 201st Energy Calibration Meeting held on 20 October 2000

1 BFS boost calibration

Esther Barbero Soto presented an update of the BFS boost calibration. Since the last meeting a new measurement (8715) has been made. Following the experiences of the previous, flawed, measurement (8566) care was taken to position the beam and calibrate the gains. The measured boost is in good agreement with expectation, and is consistent with the first measurement (7931).

2 Flux loop analysis

Pete Renton has analysed all 8 flux loop measurements made this year. The calculated 'Flux loop – NMR' offsets are consistent with each other and with previous years. A small fluctuation is seen in measurement 8234, but this is due to the anomalous behaviour of a single NMR. The NMR-to-NMR offsets are rather similar in 2000 to 1999.

3 Ambient field and spectrometer analysis

Bernd Dehning explained the improved understanding of the ambient field in the spectrometer arms. A new field map shows consistency with the first map, apart from in those points closest to the dipole, where a more reasonable behaviour is now seen. Bernd has also resolved the mystery of the large field variations seen fill-to-fill in the static flux gates: improving the calibration of one flux gate (through more careful attention to its angular alignment) and of the other (through realising that there had been a factor of two confusion with the maunfacturers specifications) leads to much narrower distributions for a given optics. The readings are now seen to be very similar in 1999 and 2000.

John Matheson has included the ambient field in his spectrometer analysis and reprocessed all ramps. He has done this taking as the field various possibilities: the raw flux gate readings, the raw field map, the field map normalised by the flux gate readings etc. As he has not yet had chance to integrate Bernd's re-calibrated flux gate data, it is probably best to concentrate attention on the model using the unnormalised field map. This gives a mean shift of 21 MeV (15 MeV) and error reduction of 7 MeV (3 MeV) for the polarisation (physics) optics (these numbers estimated by Guy Wilkinson from John's plots).

Guy showed an alternative representation of John's analysis (with the raw field map correction), shown in figure 1, with the ramps divided by year, particle type and optics. The results are extremely suggestive of an electron-positron difference of ~ 35 MeV and possibly suggestive of an optics difference of ~ 25 MeV. The consistency with 1999 is very poor. The value of the BPM error bar is not strikingly different between classes. It was

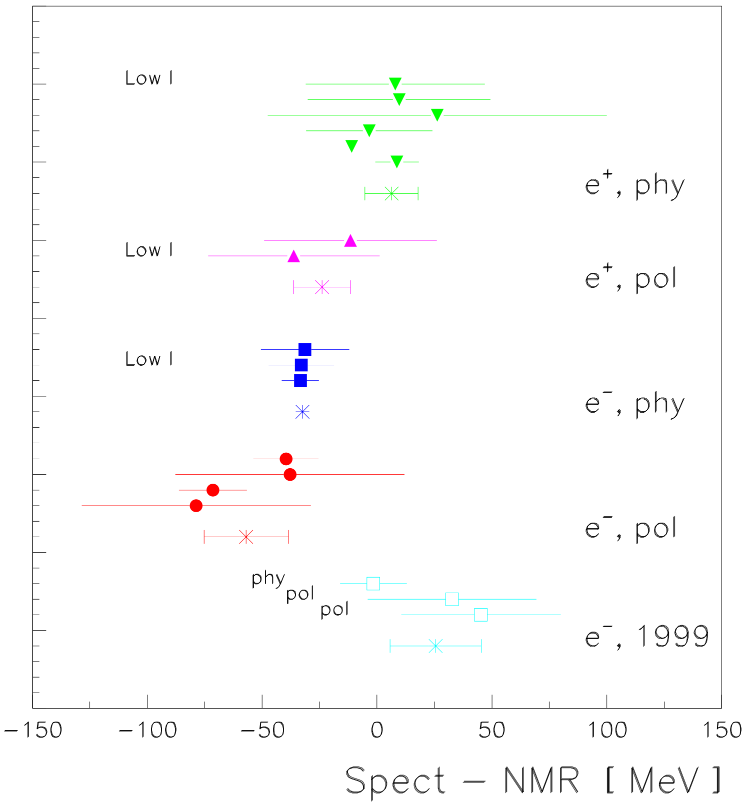

Figure 1: John's analysis of the spectrometer ramps (raw field map corrected), divided by particle type, optics and year. The error bars represent the spread from the BPM inconsistency. After each class the mean value is plotted as an asterix, with the error bar here being the RMS spread of the values.

agreed by the meeting that an important next step is to devise an experiment to see if any of the electron/positron variation is driven by an incorrect modelling of the sawtooth.

John has made a preliminary analysis of recent spectrometer measurements, which study the Q_s dependence of the BPMs, and have between them three ramps (none of which are properly BPM-gain calibrated). The preliminary conclusions are found in the transparencies; a more detailed analysis is required before these can be confirmed.

4 Effect of QFQD field

Bernd Dehning showed the response of the flux gate and NMRs to occasions where the QFQD compensation loop was powered (three measurements to date in fills 7250, 8368 and 8443). Contrary to prejudice, which imagined that the backplane of the dipoles would short circuit the generated field and thus leave the beam unaffected, it is seen that the magnets in fact see the field. The effect is different in the spectrometer and the lattice dipoles. Very strangely the available data also show a larger effect at high field than at low field for the same current. Typical values for the lattice NMRs: 125 mG at 90 GeV, 70 mG at 50 GeV for a 100 A current in the compensation loop (spectrometer sees about half this amount). This indicates that the existing description of the QFQD in the energy model is wrong; at the same time the effect on the calculated energies should be small, as the QFQD field is absorbed in the NMR calibration.

5 Final measurements

Possibilities for future ECAL measurements are in a final de-icing, the SPS MD on 2/10/2000, and perhaps in the days between the end of physics and the LEP dismantling. A proposal of how best to use any time which arises will be devised.

6 Next meeting

To be announced.

Guy Wilkinson, 23 October 2000.