Minutes of the 200th Energy Calibration Meeting held on 6 October 2000

1 RDP status

Guy Wilkinson presented the 'banana' plot after the addition of the latest calibration fill 8556, which adds a new point at 55 GeV. The residuals look very similar to previous years. The mean physics beam energy in 2000 shifts by ~ 3 MeV if one swaps between the 2000 calibration and that of previous years. It can be concluded that there is sufficient RDP data in 2000 and no more standard measurements are required.

2 BFS boost calibration

Esther Barbero Soto showed an analysis of a second measurement of the BFS boost made with the spectrometer (fill 8566 – first measurement was fill 7931), and Guy showed a parallel analysis conducted by Eric Torrence (absent). No BPM calibration was performed during the fill, and the results are sensitive to which coefficients one chooses; Esther had tried two sets – one gives a 7 MeV discrepancy between expected and measured boost, whereas another gives a 60 MeV discrepancy. Furthermore the repositioning of the beam horizontally after the RF frequency compensation was very poor.

Conclusion: the measurement needs to be repeated, but more carefully.

3 Ambient field characteristics and effects

Bernd Dehning showed a review of what has been learnt by him and Giuseppe Mugnai about the ambient field in the spectrometer arms.

The field has been continually monitored for the past two years by two flux gates (although flux gate 1 was dead for some time). In the position of these flux gates the vertical component is negative with a magnitude of a couple of 100 mG; this magnitude decreases (ie. the field increases) as LEP is ramped. Presumably this is the earth field component which is then compensated for by the field from the quads. The offset and slope with energy varies between the physics and polarisation optics; this is to be expected both because of the different QFQD currents, and because of the wigglers, which are unused in the polarisation fills. A further feature is that the offset varies from fill to fill – this is not an instrumental effect and thus can only be connected with the magnetisation/demagnetisation of the surrounding matter (to be followed up). The offset was significantly smaller in 1999.

Full field maps have been taken with LEP off, at 50 GeV and at 93 GeV for physics and polarisation optics. These maps are locally consistent with the flux gates (apart from one, where there is an offset) and have a structure which gradually rises in field towards the dipole. A large peak is observed in symmetric positions in both arms. This come from permanent magnets in two vacuum pumps. Some structure is seen in the points closes to the magnet around the mu-metal. It is suspected that this is not seen by the beam.

Two further flux gates (3 and 4) have been installed.

John Matheson showed the progress of his spectrometer analysis. He has automated his program significantly, and has included the effects of the ambient field on the bend angle, using the field maps to give the shape of the field and the local readings to give the instanteous value (in discussion it was appreciated that how to scale the map to the local values is not obvious). Results are expected very soon.

Eric Torrence (absent) has started to modify his analysis in the same manner. He estimates that the field biases the spectrometer results by -20 and -15 MeV for the polarisation and physics optics respectively, and gives a BPM error of ± 9 and ± 7 MeV respectively. Such numbers are encouraging and help the consistency of our results, but fall someway short of bringing everything into line. We await the full analysis.

4 Other matters

From the discussion two additional questions arose which need to be investigate:

- There are many pump magnets around LEP such as exist in the spectrometer arm. What integrated bending field do they give and does this explain any of the long-standing anomalies in the ECAL analysis as a whole?
- In a recent spectrometer measurement the QFQD compensation loop was powered by 50 A and all the dipole NMRs saw a energy change of 5 MeV (at ~ 90 GeV). This is unexpected as the dipoles were assumed to be shielded from such effects. It is necessary to review what consequences this has for our energy model.

5 Next meeting

To be announced.

Guy Wilkinson, 8 October 2000.