Minutes of the 179th Energy Calibration Meeting held on 25 June 1999

1 Progress with the the MBI mapping analysis

Juan Palacious presented the status of his MBI field mapping analysis.

He has measured separate temperature coefficients for the magnet core and the end field. He finds these to be $\sim -1 \times 10^{-5}/^{\circ}$C and $\sim 9 \times 10^{-5}/^{\circ}$C respectively. Knowing these he is able to make a correction when fitting the field integrals to the NMR reference probe readings, which brings the 'hot' and 'cold' maps into agreement.

He has also studied maps made with the arm probe displaced transversely from the centre of the magnet. Differences in the field integrals are observed at the 10^{-5} level. These differences are found to have a dependence with position of opposite sign in the core and end field regions. Therefore in the total integral they largely cancel and an effect of relative size $0.5 - 1 \times 10^{-6}$ is found. This effect is sufficiently small that it will be unnecessary to model the beams transverse trajectory through the magnet in the spectrometer measurement. These observations agree with model predictions of Manfred Sassowsky. The data are insufficiently precise, however, to ascertain whether the slope of the total field integeral with transverse position has a small energy dependence, which is an additional prediction of the model.

Juan will extend these studies to include maps made a different vertical positions, and will work towards providing a routine which can be used for the tunnel data, with associated systematic errors.

2 General spectrometer status

Bernd Dehning reported that the cards for the BPM electronics were not yet ready. Two new cards had been installed but were observed to have significant noise. It was hoped that this was an obvious problem.

The cooling system has been modified so that if the coil temperature exceeded a certain value, the magnet cooling would be switched from its dedicated circuit to the LEP cooling circuit.

Despite the fact that the wire sensors are now all shielded, jumps are still observed at the $2 - 3\mu$m level. These may be because of slits in the shielding, but still the jumps are suprisingly large given that the wires are believed to be well centred in the sensors. It will be interesting to watch the evolution of the behaviour in a multipoint polarisation fill.

3 Preliminary 1999 RF analysis

Mike Hildreth told the meeting that he had performed a preliminary analysis of the 1999 RF corrections. These have resulted in a file which has been incorporated in the preliminary 1999 energy files (see below).

The quality of the data are good. An interesting observation is that in contrast with recent years the calculated Q_s of the model is slightly *below* the measured Q_s.

4 Preliminary 1999 energy files

Guy Wilkinson has produced a technical, preliminary energy file for the fills up to 5782 for this year's physics runnings. He has used as NMR calibration coefficients the results of an update to the fit Pete Renton presented at the previous meeting, in which more probes are included.

It is noted that the horizontal corrector correction is very low this year. The large values observed for the RF frequency correction are very suspicious, and will be investigated.

Pete Renton has analysed a new flux loop experiment. This agrees well with the others and shows no evidence of significant non-linearity. Because of this, because the NMR calibration is similar to last year, and because the data quality is good, it is intended to assign a preliminary systematic error of 50 MeV. This error will be associated to an updated preliminary file, which will be produced next week. It assumes that the RF frequency anomaly will be understood, and that any calibration data acquired in that time will be consistent with what have gone before.

5 B field spreading

Joerg Wenninger presented his own calculations and views on the proposed schemes to redistribute the available bending field by reducing it in the dipoles and adding dipole turns to the quadrupoles/sextupoles &/or equipping the uncabled corrector magnets. This can reduce the energy loss per turn and therefore enable the machine to reach higher energies for a given RF voltage. To first order, to obtain a fractional energy gain of x one needs to put $2x$ of the bending field outside the dipoles.

The cheapest and most straightforward way of achieving this would be to cable those one third of the horizontal corrector magnets which are presently lying useless. From Joerg's expressions one would gain a beam energy increase of 120 MeV. However an additional boost is expected from the fact that the beam would go off-centre through the QDs and receive an additional dipole contribution. This effect is very difficult to calculate analytically or through simulation. Joerg proposes that in a future experiment the effect could be estimated by adjusting the existing corrector settings and measuring the beam energy either side of the adjustment, either with a depolarisation, or with the spectrometer. The meeting agreed that this would be most interesting, but were anxious that it should not intrude on time scheduled for existing measurements.

6 Next meeting

The next meeting will be at 14:30 on Friday 9 July in the pavilion.

Guy Wilkinson, 25 June 1999.