Minutes of the 105th Energy Calibration Meeting held on 13 September 1996

1 Flux Loop and Polarisation - Joerg Wenninger

Joerg Wenninger reported on progress with understanding the polarisation and flux loop measurements. This updates all Epol values for 1996 quoted so far.

For the first two Epol measurements this year, the check for the mirror resonance was not made by changing the RF frequency. For the first measurement the ambiguity was solved by the sign of the shift due to the tides. For the second, the measurement was in any case on the half integer so had no ambiguity. In checking the polarisation calibration data, Joerg identified a sign error that was introduced in the online tide correction program during the shut down. The first calibration therefore needed a large correction (20 MeV) and all other measurements a smaller correction. The first two measurements are then in excellant agreement.

New polarisation energies (in MeV corrected for tides and RF frequency only):

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29/7   45 585.0 +- 1
31/7   45 585.2 +- 0.5
19/8   44 727.0 +- 0.5
19/8   50 002.2 +- 1
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An improved analysis of the flux loop data mean that the difference between the flux loop and polarisation energies increases, but the flux loop and NMR's now agree much better (see talk by Enrico Bravin).

The energy difference E(flux loop) - E(pol) changes by nearly 30 MeV between peak-2 and 50 GeV. This cannot be explained by problems with the magnet length calculation, or for BOM/Horizontal corrector effects. No other source for a large "extra" magnetic field between the magnets i.e. seen by the beam but not by the NMR's and flux loop has been thought up.

2 NMR status - Enrico Bravin

In the tunnel, new Metrolab probes will be installed in octants 4 and 8. Examination of Metrolab probes that were already in the tunnel indicates that the radiation damage is only to the probe head, not to the electronics.

The plots of Epol-Enmr and Epol-Efl have now been updated to include the proper tide correction. The flux loop numbers have also been corrected for the energy rise during a fill, as seen by the NMR's. This improves the agreement between the flux loop and NMR's. Both see a large difference from Epol at 50 GeV (of about 30 MeV).

Enrico also showed an estimate of the NMR extrapolation error. The normalisation of all the NMR's is fixed by the peak-2 polarisation point. The mean energy per fill of each

NMR can be calculated. The mean energy of the fill is then made as a weighted average of the NMR's, forcing the proper 3/8:5/8 contribution. The rms of the NMR means for the fill divided by the square root of the number of NMR's then gives an estimate of the error. The typical error is 3 MeV for 45 GeV fills, and 13 MeV for 80 GeV fills.

3 Correctors - Joerg Wenninger

Joerg gave a description of a simple analytical model of the effect of horizontal correctors on the energy and compared with the results of running MAD for a machine with realistic alignments etc. The sextupoles are arranged to cancel the quadratic term, and the effect can be well modelled by a linear term depending only on the horizontal dispersion at each point where there is a kick. Different sets of pickups are set off to force different sets of correctors to be used. The range of energies for different sets of correctors used on the same machine is +- 2 MeV.

For physics coasts the effect of horizontal correctors is taken into account by the BOM correction (one per fill – designed to account for long term drifts). The difference between physics and calibration from BOM information was not applied, so by making a correction for the different corrector settings as calculated, no double counting has been incurred.

Joerg has added options to the LEP closed orbit program to make a test of these calculations during a polarisation MD faster. It is estimated that such a test would add an extra 1–2 hours to the MD.

4 Status of analyses

Tiziano hopes to have a draft 0 paper for the 93–95 analysis in about 2 weeks time, and will call a meeting of the people involved to discuss it.

For 1996, good progress has been made by Joerg and Enrico to resolve the discrepencies between the flux loop and NMR's. This leaves the major problem that they do not agree with the polarisation data. Joerg suspects that the depolarisation could have been made on the Qs side band (delta E of about 28 MeV). He will examine the Qs cross check data in more detail. It seems impossible to give an energy estimate for 1996 with an error better than 150–200 MeV without a second polarisation calibration at 50 GeV, and ideally more points.

5 Next Meeting

The next meeting will be at 14:00 on Friday 27 September in the pavillon.

Pippa Wells, 13 September 1996.