Minutes of the 137th Energy Calibration Meeting held on 22 August 1997

This meeting was to discuss the status for the 1997 running, in particular checks of logging and the results of the first Polarisation MD.

1 Report on Polarisation MD

Massimo gave a summary of the time used during the 30+ hour polarisation MD. The MD basically progressed as follows:

- decent polarisation $\sim 10\%$ was achieved on the 90/60 optics, but due to several problems including a spurious beamdump, the energy measurement was completed approximately 8 hours late. But, there is now at least one energy measurement to fix the scale for the 90/60 optics.
- The subsequent commissioning of the 60/60 optics took longer than expected, mostly due to problems in establishing a correct ramp sequence. The coupling of the optics was measured and corrected (solenoids off), but other measurements, like the chromaticity, were not done. The ramp was only commissioned to P–2.
- "Some" Polarisation $\leq 5\%$ was seen on the 60/60 optics, but efforts to depolarise failed, even when scanning the depolarisation kicker over a large range of spin tune. No energy measurement was made with the 60/60 optics. It was discovered after the MD that one of the Damping Wigglers in IP7 had been on during the attempts to measure/depolarise. This could be the reason for the low polarisation (if there was any at all).

The MD request for week 36 will be for 8 hours of optics commissioning, followed by 16 hours of polarisation studies on the 60/60 optics.

Florian then showed a few transparencies in which he explained some simulation work to try and understand the successes and failures of the Polarisation MD. First, he showed that the solenoid compensations required on the machine essentially matched those which were calculated with MAD, which was good news. During this MD, careful attention was paid to making sure that the Solspin bumps were closed using only the Solspin correctors, and this seems to have helped. For the 60/60 optics, which showed horrible beam lifetimes, he showed that the problems couldn't have come from the RF quantum lifetime, since this should be quite large at any of the Q_s values which were used in the MD. Instead, the current guess is that the combination of tunes in the machine were close to one of the synchrobetatron resonances, which then was causing the low lifetimes.

2 K modulation

There have been no systematic studies of the quad alignments around the machine as of yet, since (up until the meeting) there hadn't been much stable LEP running since the commissioning of the k-modulation software. The plan is to concentrate on 10 or so magnets/pickups which are suspected to be badly misaligned, and understand these before the next MD. There is some hope of using the corrections for those magnets during the next polarisation experiments. The magnet alignment data also needs to be incorporated into the calculated corrections.

3 Flux loop/NMR

After the 90/60 energy measurement, an NMR/Flux-loop comparison Flux loop calibration was done, allowing the NMRs to lock at the various energy steps. One of the LEP octants ($8 \to 1$) was missing from the flux loop at this time due to the leads being cut during the vacuum repairs; this has now been fixed. The data have yet to be analyzed.

4 Logging status

Eric showed a quick look at the logging of the various quantities that go into the Energy DST. Basically, most things look fine. Several jumps in the average NMR level can bee seen, most probably due to the change in the degauss cycle between 27 July and 4 August and the introduction of bend modulation. The rise/fill is consistent with expectations. The BCT (beam current) for electrons gets stuck from time to time – this is a known problem to the LEP people. The new SC RF cavities which replaced CU ones were not logged for some period early in the year because the database was not updated. This data will need to be recovered from the RF group's private logging. There is still a problem in that the Q_s spectrum no longer exhibits a "peak" at the correct value of Q_s, making it difficult to measure. Since this is, in effect, the strongest value against which one can cross-check the RF model, a request has been made to the RF group to try and improve the situation. Ernst claimed that they could modulate the longitudinal feedback cavity to obtain a decent signal. This is being implemented in the standard LEP settings for physics running.

5 Temperature Regulation

The "cooling expert" apparently is now back from vacation, and changes in the cooling regulation circuit will be made (or already have been by now) this week.

6 Bend modulation

Bend modulation is claimed by Enrico to result in a smaller "train" rise. No evidence was shown.

7 Sawtooth/Energy Loss

Anke showed results from the MD time spent trying to understand the energy loss at different beam energies. The horizontal dispersion, fit from the electron/positron orbit difference in the arcs, is consistently about 2% less than the MAD prediction. It is observed that correctors can change the dispersion measured within an arc, but the average dispersion around the machine is essentially constant. Overall, the energy loss is a constant 3% less than the MAD prediction, which supersedes the preliminary value of 7% shown last year.

Mike Hildreth, 28 August 1997.