Minutes of the 194th Energy Calibration Meeting held on 13 June 2000

It was shown in the previous meeting (193rd, 29/5/00) that the two depol/spectrometer MDs of this year are both internally inconsistent, in that the triplet residuals change with energy. This is alternatively observed by noting that the change in bend angle formed with different combinations of BPMs give different results. The problem was seen to be particularly acute in that arm facting the oncoming electrons. Possibly the problem is linked with synchrotron radiation? Since then time has been taken on two occasions to measure the bend angle at 50 GeV, ramp to 93 GeV and remeasure (without any polarisation measurement) using positrons, which will irradiate the other arm. Perhaps this CP transformation will expose an asymmetry in the spectrometer performance?

1 Comparison between years, and between e^-/e^+

Bernd Dehning showed an exhaustive comparison of the conditions in MDs last year and this year, and between electrons and positrons. (Sadly much of the clever colour coding in Bernd's transparencies will not be visible in the copies!) The main conclusions of this comparison are as follows:

- All distributions are very similar for electrons between '99 and '00 (put perhaps there is a small suggestion that residual heating in the BPMs is higher this year).
- When switching to positrons the temperature behaviour in the two arms inverts as expected. There is certainly more heat associated with the electron runs.

Prior to the second positron experiment Bernd and Giuseppe Mugnai installed walls of lead shielding either side of the spectrometer. This has not had any significant effect, suggesting that most of the radiation is in the beampipe.

Bernd has looked at the stability of the triplet residuals for the two positron experiments. During the experiments the gating was turned on and off. This seems to introduce an offset, which is not 100% reversible. This is not understood, but comparing the residuals with (without) gating at low energy to with (without) gating at high energy appears to show significantly improved stability with respect to the electron case.

Bernd also explained that the measurement of bend angle changes is rather robust against movements in the WPS reference sensor, as this has the same effect as parallel shifts or rotations in the beam.

2 A closer look at the problem

Eric Torrence showed a follow up to his presentation of the previous meeting.

Firstly he has analysed one of the electron fills (7251), further exploiting the redundancy in the BPM system. One arm of the spectrometer can be used to define the beam trajectory and a single BPM in the other arm used to calculate the bend angle. Making comparisons between such estimators gives another consistency test and helps isolate any BPM which may have anomalous behaviour. This analysis seems to point the finger at BPM 2 (not BPM 3 as had been suspected in the previous meeting). This is rather confusing as BPM 2 is *not* used in the standard change of bend angle calculation, which is known to be wrong...

Eric has also looked at the first of the two positron MDs. His plots are in agreement with Bernd's, but a more quantitative analysis shows that there are internal inconsistencies in the change of bend angle determination as were seen in the electron case, albeit suppressed by a factor of $2-3$. Looking at the (very) small amount of non-gated data in the experiment it seems that these inconsistencies are at a reduced level. A rough analysis suggests that the non-gated data give an energy change compatible with expectation, whereas the gated data do not.

Eric will look at the other positron MD, and at some electron data taken during physics fills.

All agreed it would be very interesting to repeat these measurements with and without gating using electrons once more.

3 Other matters

- Giuseppe and team last week made a first replacement of many dead(ish) NMRs.
- Tomorrow Anke and Joerg will have the beam (without the possibility of refilling) for Q_s vs V_{RF} measurements. They will use this either to study the inverse bending radius or two try and measure this year's impedance for the energy loss.
- Another MD is scheduled in one week's time. A decision on what to use this time for will be taken closer to the event.
- A first discussion occurred on how to measure the energy boost from the BFS (bending field spreading). In principle this can be easily done with the spectrometer by measuring the angle change when it is turned on (recall all our difficulties with the spectrometer concern ramps between very different energy regimes). Eric will have a first look at the actual physics data to get a feel for the problem.
- Guy is working on a preliminary set of energy files for this year – timescale: very soon.

4 Next meeting

To be announced.

Guy Wilkinson, 13 June 2000.