Minutes of the 197th Energy Calibration Meeting held on 4 August 2000

1 Spectrometer status

There follows a brief review of the spectrometer analyses presented in the meeting, together with results and discussions from the following week.

There are so-far 10 fills in total where the beam was ramped to 93 GeV (or beyond) (4 positron, 6 electron), plus additional fills at a single energy. Most of these have now been analysed by both Eric and John. When results can be compared, the analyses show good consistency.

- The belief that positron fills give inherently better results than electron fills seems now to be (mostly) incorrect. The last two positron fills (7676 and 7931) have show significant internal inconsistencies.
- In general calculating the bend angle with the two outermost BPMs dropped gives a result with reduced 'spect-NMR' offset.
- Manipulation of the wigglers at a given energy does not lead to significant shifts in the bend angle, nor effects similar to that seen in high energy ramps (see John Matheson analysis of fills 7519, 7676, 7667). This implies that bunch length/size is not the main cause of the BPM mis-behaviour in ramps.
- A fill with low currents (7833) has been used to test the hypothesis that synchrotron radiation is the cause of the problem. The result is inconclusive in that the fill does indeed show a not-so-bad internal inconsistency and offset, but that the behaviour is almost identical in a high current control fill very soon after (7835).
- A numerical analysis by Eric of the LHS and RHS internal consistency shows that in general it is the side which faces the incoming particle which sees the largest systematics.
- Fill 7931 was ramped 50–93 and 93–100. It is interesting that there is a significant worsening of the BPM consistency in the second step.

Figure 1 shows my by-eye/approximate representation of the results.

The next stages in the analysis will be: to study the BPM behaviour in the non-bending plane; to try and correlated the goodness/badness of the result with orbit (7833, 7835 identical results and taken very close together in time – a clue?), position in spectrometer etc; to re-analyse the 1999 data in the same manner.

Concerning the data taking it is desirable to have another fill with low currents, this time positrons, accompanied by a soon before/after high current control fill. It may be possible with these fills to load orbits similar to those of 7380/7391. Monitoring the

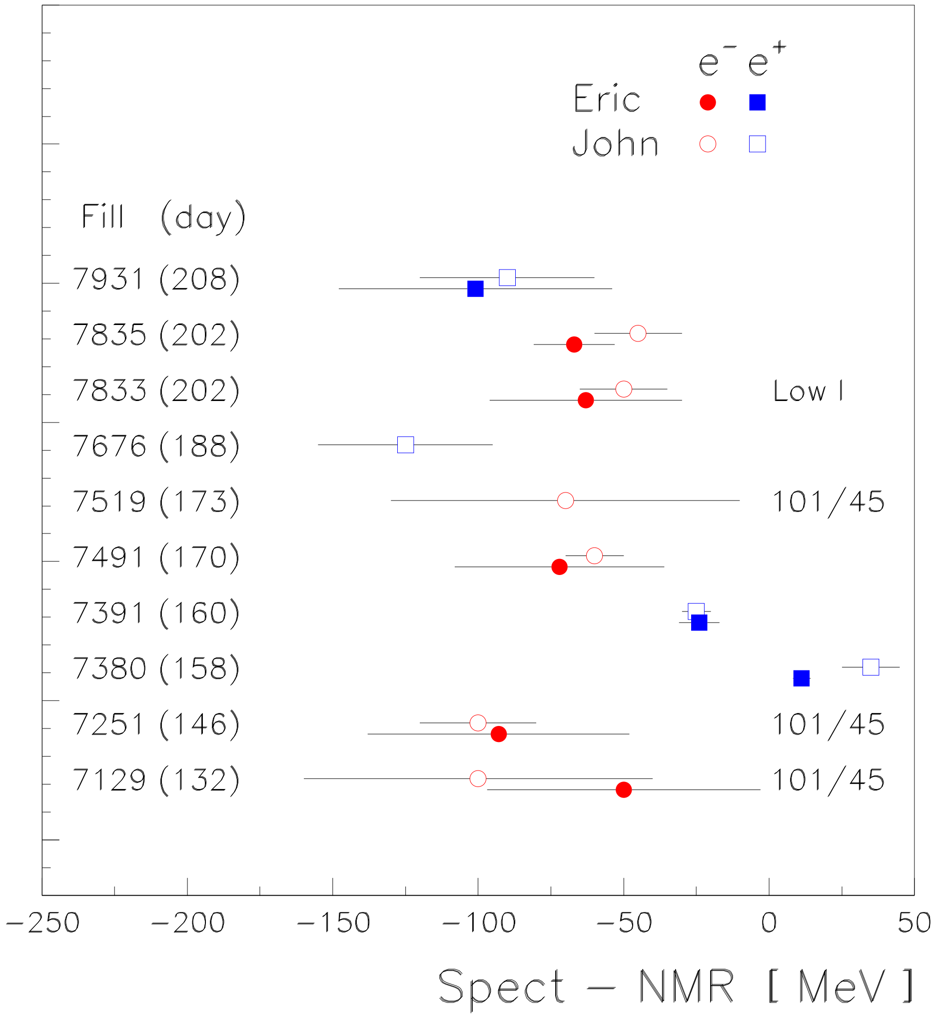

Figure 1: Plot of spectrometer-NMR for a 50–93 GeV ramp. The error bars show the spread in result obtained when using different combinations of BPMs to calculate the bend angle. All fills with 102/90 optics, unless indicated otherwise.

stability of the BPMs at 93 GeV over a period of time and then attempting to ramp to 100 GeV once more would also be interesting.

Also shown in the meeting was a first attempt by Bernd Dehning to clean up the x and y measurements in the BPMs. This is motivated by the observation that there are clear couplings and cross-correlations in the x and y movements. Bernd is pursuing a procedure with three ingredients: a transformation from the individual BPM coordinate system to a mean BPM coordinate system; a transformation from electronic signal to button signal (gains); a transformation from button signal to beam position (accounting for non-linearities etc). It is hoped that this analysis will lead to clean and stable residuals, and an improved position measurement.

2 Other news

A few days after the meeting, on 9/8/2000, a Q_s energy measurement took place, culminating at 80 GeV. Some RF instabilities meant that the RF configuration was slightly different at high energy compared to low, but at first sight the data look good.

3 Next meeting

To be announced.

Guy Wilkinson, 14 August 2000