Minutes of the 209th Energy Calibration Meeting held on 20 April 2001

1 BPM scans

Bernd Dehning reminded the meeting of a preliminary analysis made of horizontal BPM scans, performed by John Matheson, Esther Barbero-Soto and himself.

On various occasions throughout the run, time was found to fix the beam at a given nominal y position, and data taken with each BPM in turn displaced horizontally by an amount up to $\pm$5mm. The measurements were then repeated at a different y position.

The purpose of this exercise was to empirically determine the centre of each BPM. Simulations show that the non-linearities in the BPM response will lead to a parabolic dependence of the measured y value with x position. The sign of this parabola is expected to be different for scans above the BPM centre with respect to scans below. Thus a comparison of the parabolae allows the BPM centre to be determined. A further benefit of the scan is that the change in the BPM x reading can be compared with that coming from the WPS system.

The data from the scans do not behave as expected. Firstly the parabolae seem to retain the same sign, irrespective of where in y the scans are performed. Secondly the gradient of the slope of the BPM vs WPS x-fit is not as it should be (a qualitative statement which Bernd will quantify after checking...). Bernd and Esther are studying the data in more detail.

2 MBI re-mapping

Federico Roncarolo gave an update on the mapping and mapping analysis.

The drifts in Hall probe offsets, reported in the previous meeting, have continued. Correcting for these offsets leads to good agreement with the NMRs in the overlap region. However, this agreement is not seen for data using new Hall probe calibration coefficients. The recalibration therefore is possibly suspect and should be checked.

A comparison between the mean readings of the type 2 probes at the CC end of the dipole in the present campaign is different with what was seen during the ISR mapping. This difference is at the 3×10^{-5} level. (By comparing also with the type 1 probes it should prove possible to establish which of the two probes has shifted.)

The anomaly reported in the last meeting remains: that the residuals of the present data with respect to the ISR model have a significant offset. This offset reduces slightly when correcting for the above shift in NMR values to 7×10^{-5}. The residuals have been calculated for the core field alone and here agree well. Therefore it seems to be the case that the problem comes from the end fields. It has been suggested that the mu-metal may be slightly displaced now with respect to formerly. This will be checked.

The residuals of the present data to the present model are excellent ($< 2 \times 10^{-5}$?).

Residuals have been calculated between the present data and the ISR model for the *ratio* of field integrals, in cycles where the magnet was ramped from low to high energy. As expected the offset here largely cancels. However the plot needs to be remade after resolving the issue of the Hall probe recalibration.

Maps have been made with different de-Gauss cycles. No significant dependence is seen in the residuals, even when no cycle is performed.

Finally Federico presented a transparency which he had shown previously, arguing that taking maps with the NMR at different vertical positions will give negligible sensitivity to any skew quadrupole components in the field. Such maps taken in the ISR had indeed shown no variation. The meeting agreed with the reasoning, but decided it would be nice to repeat the measurements, time permitting.

3 Next meeting

To be announced.

Guy Wilkinson, 20 April 2001.