Minutes of the 177th Energy Calibration Meeting held on 28 May 1999

1 Polarisation: progress and plans

In the past week the calibration optics have been commissioned and k-modulation measurements performed. Measurements are available from the arcs; further time is necessary to calibrate the straight sections. The first depolarisation measurement is scheduled for June 2nd – 16 hours will be spent attempting to measure as many points as possible. (News subsequent to the meeting: the k-mod calibration for the straight sections is now complete; however the depolarisation measurement has been postponed due to a ruptured SPS water pipe.)

2 Energy Determination from Q_s

Anke-Susanne Muller presented an update of her work on determining the beam energy through Q_s. Q_s depends on the total accelerating voltage, the beam energy and on the energy loss per turn. Therefore a measurement of Q_s made at different RF voltage settings allows the energy to be determined. Measurements were made at 50, 60 and 90 GeV in 1998 and a preliminary measurement was made at 45 GeV in 1999.

Anke discovered that to obtain a good fit, higher order terms had to be added to the basic relation to account for the inhomogenous RF distribution. In the fit the momentum compaction factor is fixed, and the energy, energy loss and voltage scaling factors fitted, all with constraints.

The fit returns an intrinsic precision on the beam energy of 20 to 25 MeV, largely independent of energy. The systematic errors for the 1998 low energy running are estimated to be 10 MeV. These come from MAD, varying the machine parameters within their errors. A larger systematic uncertainty of 40 MeV for the 90 GeV running is attributed to not knowing all the relevant parameters for this one experiment. In principle, a lower error will be attainable in any future measurement.

The meeting agreed that Anke's results showed that this method had potential for making a very interesting estimate of the beam energy, and should be pursued. It was requested that a future presentation would give more details on the estimate of the systematics. Anke said that more measurements will be made later in the year.

3 Spectrometer status

Eric Torrence said that the remaining BPM readout boards were expected in mid-June. At present there are four boards available, which enables one triplet of BPMs to be readout.

Most of the wire position monitors have been adjusted to centre the wires. Additional shielding for sensors has been installed.

Jan Prochnow reported a follow up study to his previous presentation on the wire sensors, to investigate the benefits or otherwise of cooling. He found that the cooling system introduces an oscillation of amplitude 0.2°, which induces a vertical excursion of $\sim 1\mu$m. This is to be compared with a 5μm excursion caused by the beam for uncooled sensors. Thus he advised that all the sensors should be cooled.

4 MBI mapping analysis

Juan Palacios presented a status report on his analysis of the MBI maps.

For a stable set of maps taken with cooling water at a nominal 30° he has made two parameter fits of the measured field integral against the reference probe readings. He then inspects the residuals of this fit. The fact that four probes are available means that some algorithm is necessary to select a probe for such residual probes. It may be that Juan's approach (see transparencies) biases the final residual plot; he agreed to check this.

Fits to the core field alone give a mean residual with RMS 3×10^{-6}. Including the end fields increases this scatter to 1.3×10^{-5} (with a larger spread for the low energy maps compared with the high energy maps). When the maps made 40° are included, the residuals are seen to be displaced with repect to the 30° maps. This is attributed to the end fields having a different temperature coefficient to the core fields. Juan intends to measure the respective coefficients and thereby account for this effect prior to fitting.

5 Next meeting

The next meeting will be at 15:00 on Friday 11 June in the pavilion.

Guy Wilkinson, 2 June 1999.