Minutes of the 218th Energy Calibration Meeting held on 29 April 2002

Present: Bernd Dehning, Giuseppe Mugnai, Anke-Susanne Muller, Pete Renton (by phone), Federico Roncarolo, Eric Torrence (by phone), Jorg Wenninger, Guy Wilkinson

1 MBI mapping

Federico explained the progress in the MBI mapping since the past meeting:

- The significant shift in residuals of 1.2×10^{-4} seen after a remounting of the apparatus (reported in meeting 213) was found to be wholly attributable to poor alignment of the Hall probes. More recent maps after re-alignment are consistent with the usual 'Prevessin' results.
- The long standing discrepancy of $\sim 10^{-4}$ between the ISR and Prevessin campaigns has been understood. Recent maps made in Prevessin, but with the Hall probes of the ISR campaign, reproduce the ISR results. The ISR probes are significantly larger, and thus there is an uncertainty in the position of the field measurement. The results with the smaller probes are considered more reliable.
- Federico has determined from the data the position of the magnetic bend centre. It is 1.7 mm closer to the 'connection side' (BPMs 4,5,6) than than the nominal centre.

Many congratulations and thanks to the mapping team for their perseverance and these extremely satisfying results!

2 Spectrometer Analysis

Guy presented a near final analysis of the BPM data and updated energy determination.

By studying the consistency of the spectrometer predictions with the low energy data, and by looking at the stability of various BPM combinations with respect to residual shift, both here and at high energy, he has established that the 'inner' BPM combination is most trustworthy. All the evidence is consistent with the systematic being concentrated in the outermost BPMs. This conclusion is supported by looking at the fit residuals of the BPMs when constraining the fit to pass through the magnetic centre of the magnet.

The spectrometer data give an energy estimate which is about 10–15 MeV below that of the NMRs. The uncertainty from the BPM systematic is perhaps around 15 MeV.

These numbers will be cross-checked over the coming month, using the final magnet and sawtooth results.

Jorg said that his sawtooth comparison with Mike Hildreth had essentially converged. Mike will now produce new sawtooth estimates for the spectrometer data with his model, in order to be used in the systematic error assignment. A residual question which came up prior to the meeting, concerning wrongly estimated energy loss in the polarisation wigglers, has been checked by Jorg in consultation with John Jowett, and found not to be a significant effect.

3 Q_s Analysis

Anke gave an update on her analysis of the 2000 data. She is now very confident that the 'voltage calibration slope with energy' effect seen in this year's data is attributable to the large amplitudes of the oscillations which then induce a bias in the Q_s measurement.

She has evaluated the relevant correction factor from a fit to all 2000 low energy data sets, and applied this to the high energy data. This gives an energy estimate with respect to the NMRs of $-45 \pm 37\,\mathrm{MeV}$, where the error quoted is solely that from the uncertainty in this correction.

Recall that there are 3 measurements made in 1998 and 1999 which are not afflicted with this problem. They gave a result of something like $-10 \pm 25\,\mathrm{MeV}$, although these need to be reanalysed with the new NMR energies provided by Guy.

4 Discussion on strategy

The indications are that the spectrometer, Q_s and flux loop give consistent energy estimates. The meeting discussed for the first time strategies for combining the results. These need to be considered in more detail, but the group agreed to the principle of introducing an energy shift through a global offset, most probably (but not necessarily) year independent, together with an improved error estimate.

Over the coming month Guy will work on producing final versions of the energy files. These will *not* have any offset introduced from the above consideration, rather they will contain year specific bug fixes and model refinements. These will be released together with the information that (an) offset(s) may be announced later, together with a new error estimate. The timescale of this announcement will be at the end of the paper writing.

The format of the paper will be discussed at the next meeting.

5 Next meeting

To be announced.

Guy Wilkinson, 7 May 2002.