Minutes of the 216th Energy Calibration Meeting held on 30 November 2001

Present: Bernd Dehning, Federico Roncarolo, Eric Torrence (by phone), Pete Renton, Eric Lancon, Pippa Wells, Gisueppe Mugnai, Arno Straessner, Anke-Susanne Muller, Guy Wilkinson

1 Radiative Return Analysis

Pete gave a survey of the status of the beam energy determination through radiative returns, drawing on the material presented at the October WW workshop in Cetraro, Italy. Comments were then made on behalf on the experiments from Pete, for DELPHI, Eric Lancon, for ALEPH, Arno, for L3, and Pippa, for OPAL. Eric Lancon also represented the views of the WW steering group.

Preliminary results are available from OPAL, DELPHI and ALEPH. An unofficial average of these has a statistical error of 27 MeV and systematic error of 28 MeV. The central value of this unofficial average is not available, but can be estimated from the plots in Pete's transparencies. It is something like -50 MeV with respect to the LEP energy files (E_{beam}). This offset is significantly reduced with respect to the average from an equivalent analysis the previous year. The change can be attributed to the addition of new data, and an evolution in some of the preliminary results.

DELPHI and OPAL intend to finalise and publish their analyses for Summer 2002. L3 have preliminary numbers available, and these will be made public soon; these may be published later in the year. ALEPH are in a delicate position because the person responsible for the preliminary analyses has left the collaboration. They are actively looking for new manpower to complete the analysis, but the timescale for this to occur is therefore perhaps longer than for DELPHI and OPAL. Any final combined number will then only become available late in 2002 at the earliest, which is significantly later than when the Energy group hopes to complete the calibration with the machine based methods. Therefore it was decided that the Energy group should plan on publishing a final beam energy without these measurements as input. It may still be possible at a later date, such as when writing the 'Physics Report on LEP 2', to take account of the radiative return results.

Both ALEPH and L3 have some reservations about the true reliability of the radiative return measurements as estimators of the beam energy. The analyses are very delicate and the preliminary numbers have changed significantly with time. This must be discussed again at a later date. Certainly the Energy Group encourage the experiments to complete this work.

2 Energy Files

Guy announced that he intended to re-analyse all the LEP2 data sets, correcting known year specific bugs in the energy model etc. This work will result in new energy files.

3 Progress with the Q_s analysis

Anke has formulated a very promising hypothesis to explain the troublesome year 2000 slope in the voltage calibration factor with energy. In that year, and in that year alone, it was necessary to excite the beam to observe a measurable Q_s signal. Anke showed analytically that with large oscillation amplitudes, such as would be induced by the excitation, the measured Q_s will be shifted downwards with respect to the true value by an amount itself proportional to Q_s. This would generate the effects seen in the data. Furthermore the size of the effect appears, at first look, to be compatible with what is expected from the excitation.

Anke will evaluate this idea in more detail, and re-analyse the 2000 data. Note that this explanation superseedes the previous 'damping hypothesis'. This was ultimately unappealing, because of the size of damping required.

4 News on the mapping

Federico reported on the analysis of the attempted measurement of the horizontal bending field. This is performed by comparing measurements made with rotated Hall probes on the mapping arm (see transparencies). The analysis so far does not return an unambiguous result for the field component, but suggests an absolute value less than 10 Gauss. Guy will estimate what the consequence of such a field would be on the BPM analysis. It was also mentioned that more information on this field component is in principle available from the harmonic measurements made with the rotating coil, a couple of years previously.

Bernd reported on measurements made by Paul Leclere on the relative alignment of the Hall probes to the NMR probes. These show that indeed the probes were significantly ($\mathcal{O}(5\,\mathrm{mm})$) offset from their nominal positions for the final maps of the year. The offset is of the correct sign to explain the 1.2×10^{-4} residual shift presented by Federico in the 213th meeting, but calculations suggest it can only account for a change of 8×10^{-5}.

Giuseppe will explore the possibility of making some final maps with realigned Hall probes, and with Hall probes as used in the first ISR campaign.

5 BPM news

Bernd told the meeting that work was underway to set up a lab test facility for the BPMs.

The absolute gain measurement made with the wirse system still needs to be understood.

6 Next meeting

To be announced.

Guy Wilkinson, 8 December 2001.