Minutes of the 143nd Energy Calibration Meeting held on 7 November 1997

1 Radiative Return to the Z

We heard talks from ALEPH (Marie-Noelle Minard) and OPAL (Andrea Biguzzi, Scott Talbot, Graham Wilson) on measuring the beam energy from radiative return events. Results from DELPHI have been shown in previous meetings.

In summary, there is reasonable agreement on the statistical error from the experiments. With four experiments combined, 500pb^{-1} per experiment and all data at 183 GeV, the statistical error would be about 16 MeV from $qq\gamma$ events, and 40 MeV from $\mu\mu\gamma$ events. The main loss in statistics from going to higher energy is from the fall off of the cross section. The experimental detection efficiency drops by typically 5%. The largest unknown systematic at present is from theory, modelling the ISR spectrum. There will also be systematic uncertainties from jet angle biasses for the $qq\gamma$ events. These can be in common with some of the systematic uncertainties from the W mass measurement.

Whether the radiative return events are eventually used to control W mass uncertainties or to give a measure of the beam energy, in either case it is crucial to model the photon spectrum. S. Jadach showed the status of the YFS3ff Monte Carlo, which is complementary to KORALZ. The release expected very soon will include ISR, FSR, flavour generation, beam energy spread, hadronisation (LUND style) and full electroweak corrections (DIZET style).

In the short term future, tau decays should be implemented and more detailed checks made. Initial-final state interference will take longer.

2 Understanding polarisation MD 4372

Florian Sonnemann showed results from fill 4372, where the level of polarisation at 45 and 50 GeV was disappointingly low. He has been trying to understand this with an analysis of the Fourier components of the nearby depolarising resonances. Errors in the amplitude of the fourier components come from the irregular sampling (irreducible 5micron), and from the remaining alignment uncertainties (10 micron). The k-modulation measurements have been a great success here. However, the uncertainty depends strongly on the number of missing pickups.

3 Comparison of NMR and EPOL

Slides from Peter Renton were shown, comparing the NMR's fill by fill with the polarisation points. In each case the NMR's are normalised to the average of the polarisation points at the lowest energy in the fill, and the energy difference at this point is then set to zero. The plots shown are for either the 1995 style NMR48 combination, or for the average of all probes. After a mini-ramp, the nominal extra energy is subtracted from NMR and Epol so that all the fill fits on the same plot.

As seen before, the results are somewhat sensitive to which probes are used.

4 Comparison of NMR-fluxloop and NMR-Epol slopes

Pippa Wells showed NMR-fluxloop comparisons from Joerg Wenninger. For each flux loop and each NMR, a line is fitted: $B_{\rm NMR} = a + bB_{\rm fluxloop}$. The fitted slopes b are different for different probes but reproduced rather well from fill to fill. The residual $B_{\rm NMR}$ from this line is then found. The residuals are averaged over NMR's for each flux loop point where the NMR's locked. The average residucal is consistent with zero at nearly all points. The r.m.s. scatter is of order 0.1G (i.e. around 10 MeV). From probe to probe, there are strong local slopes that change with energy w.r.t. the flux loop fit. These local slopes are different for different probes, but similar from fill to fill.

Pippa fitted the local slopes for the NMR-fluxloop data in the 40–55 GeV range, and the slopes for each probe in the NMR-Epol data shown by Guy Wilkinson at the previous meeting. There is poor agreement between the NMR-fluxloop and NMR-Epol slopes. Some confusion of the numbering of probes in the strings may still be there, but the octant to octant numbering seems to be unambiguous.

More flux loop measurements were requested for Monday 10 November, just after the last physics run, but before the magnet heat test with the ring closed.

5 Next Meeting

The next meeting will be at 14:00 in the Pavillon on Friday 21 November. Note the earlier time, now that scheduling meetings have finished.

Pippa Wells, 12 November 1997