Minutes of the 167th Energy Calibration Meeting held on 23 October 1998

1 Beam energy spread derived from bunch length

Eric Lancon has extended his analysis (see minutes of 9 October) to the 1996 data, and to the 130-136 GeV sample in 1997. The relevant formulae are given here as a reminder:

$$\sigma_{E_{\mathrm{beam}}} = \frac{\sqrt{2}E_{\mathrm{beam}}}{\alpha_{\mathrm{c}} R_{\mathrm{LEP}}} Q_{\mathrm{s}} \sigma_z^{\mathrm{ALEPH}},$$

and

$$\frac{Q_{\mathrm{s}}^{\mathrm{coh}}}{Q_{\mathrm{s}}^{\mathrm{incoh}}} = 1 - \kappa \frac{I^{\mathrm{bunch}}}{300\mu\mathrm{A}}.$$

The values of Qs in 1996 were shown, together with the derived values of $\sigma_{E_{\mathrm{beam}}}$ as a function of ALEPH run number or fill number, and the distribution of $\sigma_{E_{\mathrm{beam}}}$ for each energy point.

Eric is still using a value of $\kappa = 0.045 \pm 0.022$, derived at the Z. After discussion it was decided to scale the value from the Z by $1/E_{\mathrm{beam}}$, but to retain the error of 0.022 to cover the unknown changes in impedance etc. This procedure will be further debated in the coming week.

The table below shows the values derived by Guy Wilkinson from the predicted beam energy spread weighted by the DELPHI lumisity, and by Eric using ALEPH data, where a good Q_{s} measurement is available (approx. 60% of the data in 1997).

There is very good agreement for the nominal energy points with high statistics (i.e. many fills). Some anomolies remain to be checked for one or two points, such as the 180.8 GeV centre-of-mass energy point.

Caution: these spreads are the beam energy spread. The should be multiplied by $\sqrt{2}$ to give the centre-of-mass energy spread.

Year	E_{CM} [GeV]	Guy	Coherent Qs	Incoh. Qs $\kappa = 0.045$
1996	161.3	102	100.5	109.5
	164.5	106	93.3	100.7
	170.3	115	121.0	129.2
	172.3	117	107.4	114.5
1997	130.0	66	66.0	73.2
	136.0	74	75.6	82.8
	180.8	141	102.9	109.9
	182.0	164	140.9	149.4
	182.7	154	148.2	160.1
	183.8	145	119.7	128.9

2 Next meeting

The next meeting will be on on Friday 30 October at 15:00. This will be a detailed editorial session on the 1997 paper.

Pippa Wells, 26 October 1998