# Minutes of the 126th Energy Calibration Meeting held on 18 April 1997

## 1 Comment on measuring dispersion

Joerg Wenninger pointed out that there has been a request to measure dispersion at the IP's during physics. This requires moving the RF frequency to shift the energy. This means that doing the measurement parasitically during physics may be more delicate than at the Z. As the emittance increases, this will increase the backgrounds in the experiments, and also because there is little safety margin of RF volts.

## 2 LEP beam energy measurement using Moller scattering

John Field presented the conclusions of the NIM paper on Moller scattering (ref: C. Cecchi, J. Field, T. Kawamoto, NIM A385 (1997) 445-455). This paper includes some improvements of the analysis of the beam energy measurement since the LEP2 yellow report.

The proposed apparatus uses a hydrogen gas jet target (similar to that used in UA6) and detects the two scattered electrons from Moller scattering, and also the recoil proton from ep scattering. The paper demonstrates that if the beam energy is cross calibrated at lower energy against resonant depolarisation, then the necessary beam parameters, gas jet position and detector dimensions can be monitored to sufficient accuracy, leading to a predicted error of less than 3 MeV.

The two big areas uncertainty at present are

- Modelling of machine backgrounds at the only plausible position to put the apparatus (IP7)
- Evaluation of the error incurred by extrapolating from the measurement of a single beam energy at IP7 to the centre-of-mass energy at the IP's. This is more complicated than calculating the centre-of-mass energy compared to the average energy around the ring, since the cancellations that reduce the error no longer occur.

We agreed at the meeting that Georg von Holtey and Mike Hildreth would be asked to look into understanding these two major questions. If the projected error from Moller scattering then still looks promising, we will make a serious investigation of possible support within the LEP experiments for designing and building the detector, and within SL for designing and building the gas jet target including the modifications to the beam pipe etc. A very rough estimate of the total cost would be around 2 million CHF, of which about half would be for the gas jet target. Another worry would be the time scale of the project - this was essentially shelved one year ago, after the LEP2 workshop, and

now there are only 3 more years of LEP running approved, plus possible running in the year 2000 if funds are found. Even if the Moller error turned out to be of similar size to the projected error for the depolarisation plus magnetic extrapolation approach, it would provide an independent cross check of the extrapolation uncertainty.

# 3 Next meetings

The next two meetings will be:

- Friday 25 April - Paul Bright-Thomas practice talk for Vanderbilt and 93-95 analysis/paper
- Friday 2 May - Planning for 1997

Pippa Wells, 21 April 1997.