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F.Perrier
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Minutes of the Z→q$\bar{q}$ meeting
CERN, 10 May 1989

Alain Blondel remarks that the possibility of using KORALZ and DYMU2 to generate q$\bar{q}$ events should be investigated.

John Harton studied the error on the Z width obtained from the fit to the cross section ratios σ_i/σ_{peak} and from the fit to the absolute cross sections σ_i which requires an absolute luminosity measurement. The statistical error is given by $1400/\sqrt{L(nb^{-1})}$ MeV and is stable provided the fraction of the luminosity spent at the peak is less than 2/3. A 3-point fit and a 5-point fit give similar results (see attached figures).

Lluis Garrido came to the same conclusions using an analytical solution of the χ^2 fit in the case of a Breit-Wigner resonance and using a complete calculation of the line shape as well. The error is underestimated by 20% in the Breit-Wigner calculation. The dependance on the fraction of the luminosity spent at the peak and the scan energy range are weak, with a minimum for 40% and ±2.5 GeV respectively. The error on the number of neutrinos (see figure) is less than 0.3 for more than 1500nb^{-1} and point to point errors better than 1%.

Henri Videau studied the errors on the mass and width using a Breit-Wigner resonance with a radiative tail. If the scan energy range varies from ±1 GeV to ±2 GeV, the error on the mass does not degrade much (21 to 25 MeV) but the error on the width is improved by a factor 2 (80 to 40 MeV). The fraction of the luminosity spent at the peak does not matter as long as it is less than 60%. Henri also stressed that the measurement of the width from the peak cross section is better than the measurement from the scan for 1000nb^{-1} and 2% error on the luminosity and for 300nb^{-1} and 5% error on the luminosity. The limits one can obtain on heavy lepton masses from the measurement of the width were recalled.

Discussion: The following strategy emerged from the discussion.

1 - If necessary, 25 nb^{-1} should be devoted to measure the Z mass to ±200 MeV.

2 - One should first run at the peak and get experience with the detector, the machine and the luminosity measurement.

3 - Then one should explore outside the peak. A 5-point fit is preferred as it provides redundancy and a meaningful χ^2.

4 - 40% of the luminosity at least should be spent outside the peak.

5 - A ±2.5 GeV step is preferred for a 3-point scan.The side points should be between 1.5 GeV and 3 GeV off the peak. The exact positions and luminosities are uncritical.

John Harton will give a presentation in Athens including event selection and background studies.

Fabrizio Palla studied the event counting using only the calorimetry. The relevant variables are the total energy and the transverse energy. The efficiencies for $q\bar{q}$ events, τ pairs and two photon events are given as a function of the cuts. Concerning Bhabha events, s and t channel contributions were shown to be equal at $\theta=18°$ which will be the suitable cut if one wants to keep Bhabhas without tagging. In a preliminary study, it was found that the noise has no effect on the counting efficiency.

Mark Dinsdale studied the event reconstruction with Julia224. No major problem was found with tracks. A problem with HCAL association is being worked on. More work is needed to define a standard set of cuts.

Eberhard Lange will provide a standard ALPHA routine for hadron event selection.

Andrew Halley gave a preliminary report on the charge asymmetry in hadronic events. The charge of a jet is measured as a weighted sum of the charges of the particles in the jet. The charges in two jet events have opposite signs in 90% of the cases. The measured asymmetry from these events agrees with the expected one in a b quark sample.

NEXT MEETING : June 8,1989 9:00 am. Room 32-1-A24