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M E M O R A N D U M

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Subject/: Status report and future plans of the NA4 Collaboration  
Objet

The NA4 experiment has finished data taking with carbon target. Data from 1979 are in the last stages of analysis. They will yield the  $F_2$  structure function and information on the production of multi-muons with large effective masses. While the multi-muon data are statistically limited (several hundred dimuons with masses above 4 GeV), the errors on  $F_2$  will be mainly systematic. Efforts are in progress to reduce them below the present level of ca. 10%.

In 1980, data on +/- asymmetry of the deep inelastic cross-section were taken. At 200 GeV we expect about  $2 \cdot 10^6$  analyzable events from about  $2 \cdot 10^{12}$  gated muons, while at 120 GeV our data sample is about one-half as large. A number of auxiliary measurements (e.g., on the +/- difference of stopping powers) were taken. Short runs were devoted to normalization of the 240 GeV and 280 GeV data and to tests with a "hydrogen-equivalent"  $\text{CH}_2$  target. Altogether, our data taking in 1980 followed closely the program outlined in the Status Report to the SPSC on 15 January 1980. The analysis of the 1980 data has started.

During the long shutdown the 40 m long  $\text{H}_2/\text{D}_2$  target will be installed. We should be able to switch from  $\text{H}_2$  to  $\text{D}_2$  on short notice due to the large Dewar capacity. Our main aim in 1981-82 is to measure structure functions on hydrogen and deuterium as accurately as possible. A number of steps are being taken to reduce all known sources of systematic errors, especially those due to the iron-core magnet. In the region around  $Q^2 = 50 (\text{GeV}/c)^2$ ,  $x = 0.4$  we hope to decrease both statistical and systematic errors sufficiently to achieve an interesting determination of  $R = \sigma_L/\sigma_T$ . However, for that purpose, we should need running time at different incident energies.

We are also considering the extension of our acceptance to lower  $Q^2$  and lower  $x$  in order to be able to perform tests of QCD using only the data from our experiment and also to obtain better overlap with other experiments. This would be achieved essentially along the lines of our Addendum to the Proposal CERN/SPSC/74-120/P 19 Add. 3.

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