

CERN

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To : Professor P. Preiswerk

From : A.M. Wetherell

Re : Experimental Programme - Periods II and III (1963-64)
 G. Cocconi, E. Lillethun, J.P. Scanlon, C.C. Ting,
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1) Small Angle p-p Scattering

An experiment on small angle p-p scattering ($2 \leq \Theta \leq 20$ mrad), to study the real part of the scattering amplitude, is in preparation. Sonic spark chambers will be used; tests have indicated that spark positions can be located to $\leq 1/2$ mm. The experimental arrangement to be employed will allow angle measurements to be made to ± 0.2 mrad. Recent developments for this experiment include improvements in the spark gaps and trigger circuits, in the sonic detectors and in the method of data recording. A system for recording the digitized times of flight of the spark sound waves on magnetic tape using an IBM 7330 tape unit is being prepared by the CERN electronics group. 7 new spark chambers are presently under construction.

The apparatus should be ready by the beginning of September 1963. It is necessary then to have a high-energy proton beam available for running-in tests of the experiment in September - October 1963.

The scattered 20 mrad proton beam in the East Area should be used and the beam transport requirements are $2 Q_2 + 6 M_2$. Dr. Kowarski has agreed that the 7090 computer will be available for nightly operation during the course of the experiment.

It is estimated that a total of 48 shifts will be needed to measure the small angle differential cross sections at three incident energies.

2) Experiments with the Slow Extracted Proton Beam

Experiments on (i) Inelastic p-p scattering,
 and (ii) Deuteron production in p-p collisions
 have been briefly discussed for the slow extracted proton beam Mk.1, in the South Hall.

Current work with the internal proton beam and a CH_2 -C difference technique indicate interesting features in the scattered proton momentum spectra for incident momenta between 4 and 8 Gev/c.

The extracted proton beam with a liquid H₂ target would permit a much better survey of the excitation of nucleon states by the process $p + p \rightarrow p + p^*$.

The reaction $p + p \rightarrow d + X$, X being any final state product, is of general interest in the context of high momentum transfer processes and because of the high intensity of the beam available is more amenable to study than other high momentum transfer reactions.

A liquid H₂ target inside the South Hall target zone and three channels at different angles each having a spectrometer composed of 2 M₂ , scintillation counter hodoscopes and perhaps sonic spark chambers could be used for both the proton isobar and the deuteron studies.

Considering the experimental programme for the small angle p-p experiment, the operation of the new ejector system and the conglomeration of beams in the South Area, it is probably realistic to think of working on experiments with the extracted beam from the first quarter of 1964.

