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EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

withdrawn

Date : 3 April 1964

Memorandum

TO : Members of the EEC and NPRC

FROM : Group : Mermod-Winter and Institut de Radium (Vivargent)

SUBJECT : ($\pi^{\pm}$ p) small-angle scattering.

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This experiment is designed (proposal of 1 May 1963) to provide information on the real part of the (πp) scattering amplitude through interference with the Coulomb scattering amplitude.

Two similar experiments on proton-proton scattering are in progress now, S24 (Cocconi-group) and E46 (Lohrmann, Hamburg). It is the purpose of this note to point out some virtues of the proposed experiment.

1) In a recent experiment, Steiner, Chamberlain, et al. at Berkeley have measured polarization in p-p scattering, using a polarized target. The maximum polarization was found to drop from +34% at 2.5 GeV/c to +13% at 7 GeV/c, exhibiting at all momenta a broad maximum between 400 and 800 MeV/c momentum transfer.

2) It follows from these data that the contribution of spin-dependent, singulet and triplet amplitudes to coherent p-p scattering will be important. A separation of these spin-dependent real parts on the basis of different angular distributions, seems to be difficult. This difficulty does not exist in πp scattering.

3) In scattering pions on protons at small angles, the sign of the interference term can be inverted by changing from negative to positive pions.

This will give an important check on systematic errors, which tend to increase the cross-sections as small angles; it also doubles the effective interference term.

4) The experiment is designed to accept near-elastic pion-proton scattering at small angles. Thus, data on isobar excitation will be obtained as a by-product. The difficulty of double-isobar excitation, encountered in proton-proton scattering, is not present in this case.

5) As a joint effort with the Institut de Radium, Paris, a flying-spot scanner with on-line computer operation has been developed in Paris for the analysis of spark chamber data. The analysis of simple data as from the proposed experiment will give this Institution experience with the device for later, more complex data.

6) The proposed experiment was recommended for acceptance by the EEC in its meeting of 12 November 1963, following a Tuesday Seminar on 22 October 1963. The equipment for the experiment will be tested during June - July in d_{15}, parasiting on Maglić.
We therefore request machine time in a modified d_{15} beam starting after the October 1964 shutdown.