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COMPATABILITY OF THE CHARGED AND NEUTRAL HYPERON BEAMS

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ABSTRACT

The charged hyperon beam proposal (69) and the neutral hyperon beam proposal (8) are incorporated in a common floor plan.

Two proposals have been submitted for the construction of short-lived beams: a charged hyperon beam study, Proposal 69,[1] and a neutral hyperon beam study, Proposal 8.[2] The purpose of this note is to show that the two beams could be accommodated in a common floor plan and could perhaps take some data simultaneously. Both beams would use the 200-GeV diffracted proton beam in Area 2 to produce the hyperons and would use a magnetized iron block 6-8 meters long as a hadron shield just after the proton target. The charged and neutral channels in the magnetized iron would be tapered, with a maximum cross section of ~ 1 cm × 1 cm. The problems of muon and neutron backgrounds transmitted by such a shield will be common to both experiments and require further study. It may not be possible to operate at full intensity with both channels open. An average magnetic field of 36 kG over six meters is assumed in the channels, which will deflect the 150-GeV/c negative hyperon beam through 45 mrad. A deflection of this magnitude is necessary to give sufficient separation between the charged and neutral beam lines.

The floor plan is shown in Fig. 1. It will be convenient to orient the magnetic field in the shield and the magnetic fields in the experimental analyzing magnets normal to each other. In the figure, the shield field is horizontal, and the negative beam rises vertically at an angle of 45 mrad. One requirement for simultaneous running will be no material in the region "D" within about 20 ft of the hadron shield. A second requirement might be reduced proton intensity on target because of background. Both of these requirements could be satisfied by the two experiments during tuneup and the measurement of hyperon yields by observing the hyperon decays. Both proposals discuss the measurement of hyperon cross sections by inserting a liquid-hydrogen target in the "D" region and observing the attenuation of the hyperon flux. These data would necessarily have to be collected in separate runs, as would the negative hyperon yield measurements using a differential gas Cerenkov counter.

REFERENCES

[1] J. Lach et al., Elastic Scattering of the Hadrons, National Accelerator Laboratory Proposal 69, 1970.

[2] L. Pondrom et al., Experiments in a Neutral Hyperon Beam, National Accelerator Laboratory Proposal 8, 1970.

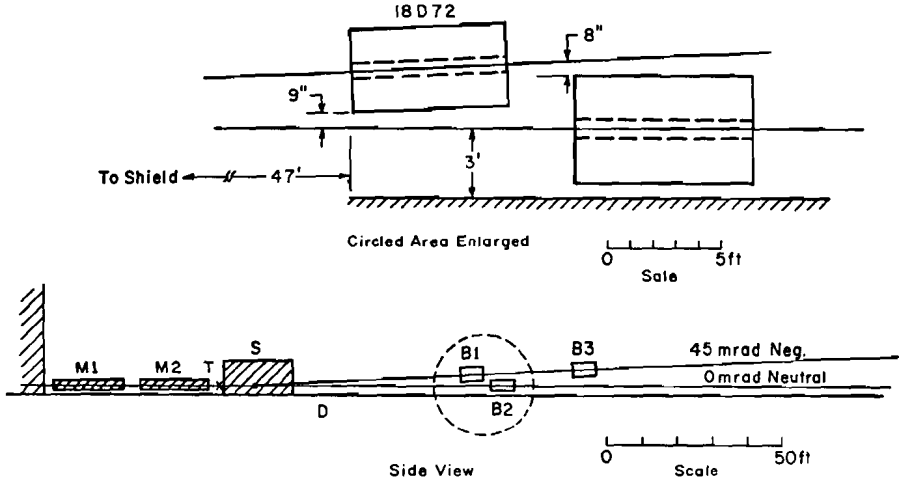

Fig. 1. Side view of the charged and neutral hyperon beam setups in Area 2. The diffracted proton beam goes through M1 and M2 to vary the production angle and strikes a target T. The magnetic field in the iron hadron shield S is horizontal. The region D will be used to insert hydrogen targets and the differential Cerenkov counter. Wire planes are not shown. B1 and B3 are two 18D72 BNL magnets, and B2 is a 24D72 ANL magnet. A neutron counter 330 ft from the shield in the negative beam line is not shown.