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M e m o r a n d u m

To : Members of the EEC

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Subject : Hyperon beam

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The approved running time for the measurement of  $\Sigma^-$  total cross-sections on hydrogen and deuterium will end with the next East Hall PS period. The information collected up to now gives a statistical accuracy of  $\pm 1.2$  mb on  $\sigma_T(\Sigma^- + p)$  and possible systematic effects have been studied in detail using the data; we estimate the remaining systematic uncertainty to be less than  $\pm 1$  mb. The next East Hall period will be used to collect more data on  $\Sigma^-$  total cross-sections and to perform an auxiliary measurement of  $\sigma_T(p + p)$  to an expected statistical accuracy of about  $\pm 0.7$  mb. That measurement of a known total cross-section will provide a more complete understanding of systematic effects. One to two days of that period will be used to test parts of the leptonic decay equipment which are already installed behind the total cross-section apparatus; in particular we will operate and photograph the streamer chamber placed in the large magnet which will be used to measure the momenta of the decay products in the leptonic decay experiment. Our plans are to finish the installation of the leptonic decay apparatus during the shut-down. The set-up is the one shown in Fig. 2 of our proposal PH I/COM-69/53 (that figure is also attached to this memorandum) with some improvements. Proportional chambers have been added on each side of the DISC counter; these chambers have been used during the total cross-section measurement and they give the direction of the incoming hyperon to a precision of  $\pm 0.5$  mrad in space. It is, therefore, no longer

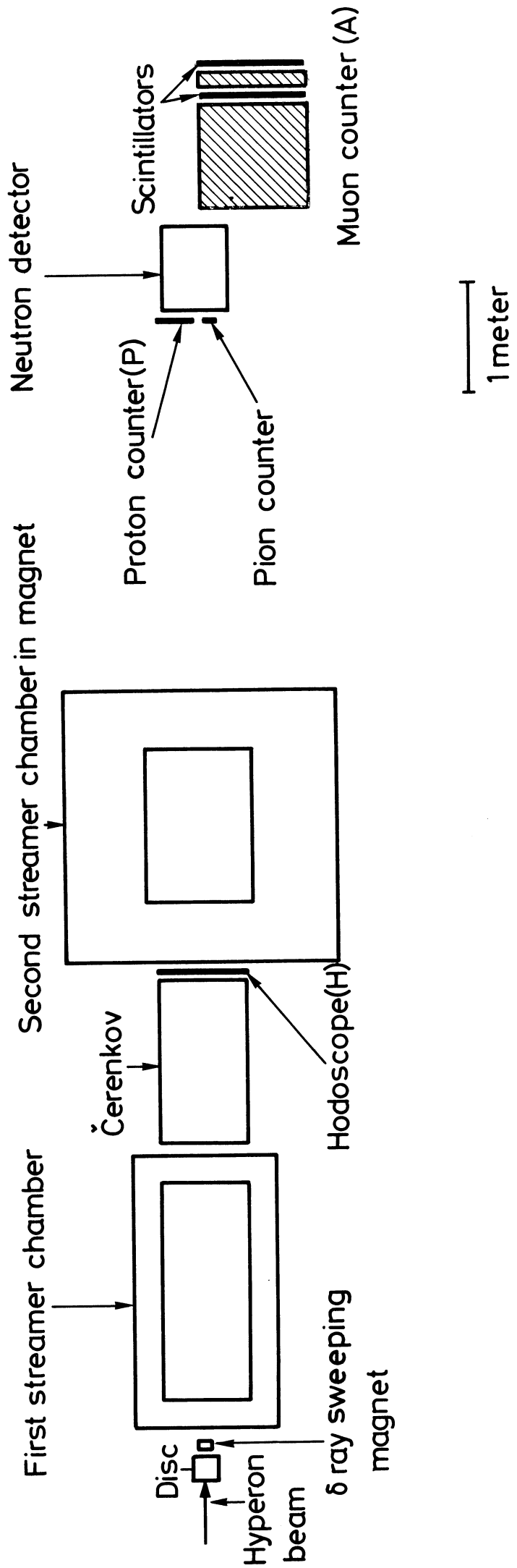
necessary to request a primary track length of about 50 cm in the first streamer chamber to measure its direction. This improvement corresponds to a gain of a factor 2 to 3 with respect to our original proposal, due to the decay factor.

During the setting up of the hyperon beam and the measurement of the production rates, we have taken pictures with a streamer chamber prototype placed behind the DISC in the position of the first streamer chamber, for intensities of the incoming beam between 0.5 and  $2 \times 10^{11}$  protons per burst. Scanning and measurement of these pictures indicate that an intensity of about  $10^{11}$  protons gave a tolerable number of background tracks in that chamber. This proton intensity corresponds to 40-50  $\Sigma^-$ /burst identified by the DISC, while our original proposal was based on 100  $\Sigma^-$ /burst. The gain obtained by the addition of the proportional chambers is almost exactly cancelled by the smaller number of  $\Sigma^-$  in the beam and our estimates are based on 40  $\Sigma^-$ /burst.

Request for machine time and expected number of events

For testing and data taking on the leptonic decay experiment we request a total of 10 weeks. During that running time we expect the following numbers of useful events:

$$6000 \Sigma^- \rightarrow ne\nu, \quad 200 \Sigma^- \rightarrow \Lambda e\nu, \quad 50 \Xi^- \rightarrow \Lambda^0(\Sigma^0)e\nu$$



Leptonic decay apparatus