EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH





CERN/SPSC/77-114
SPSC/M102
16.11.1977

M E M O R A N D U M

To : I. BUTTERWORTH / SPSC Chairman

From : WA2 experiment

Subject: Request for Running Time

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1. Use of the previous allocation

We have been allocated an integrated intensity of $10^{17}$ protons on target 1. Assuming that the period 9a yields $2{\cdot}5\times10^{16}$ protons, we will have used at the end of the year a total of $9\times10^{16}$ protons distributed as follows:

$2{\cdot}5\times10^{16}$ protons to set-up the leptonic trigger

$5\times10^{15}$ protons to measure the $\Xi^-$ polarization

$6\times10^{16}$ protons for data taking on leptonic decays.

The analysis of the polarization data and of a leptonic sample are underway. Preliminary results will be presented at the open session of the November SPSC. We estimate that we have already, with various cuts made, about 400 $\Xi \to \Lambda e\nu$ and 350 $\Sigma \to \Lambda e\nu$ events in our leptonic sample. With $2{\cdot}5\times10^{16}$ protons in period 9a, we should reach 700 $\Xi \to \Lambda e\nu$ and 600 $\Sigma \to \Lambda e\nu$.

2. Request for the leptonic decay experiment

In answer to P. Falk-Vairant's inquiry about running time requests, we had given in June an estimate of $3\times10^{17}$ protons for data taking. That estimate assumed some improvements of the $\Xi^-$ and $\Sigma^-$ fluxes which have been successfully implemented. We require $2\times10^{17}$ protons to finish the data taking for the $\Xi \to \Lambda e\nu$ and $\Sigma \to \Lambda e\nu$ experiment. We use a proton beam transmitted through $T_1$ to produce on $Y_1$ the hyperon beam. With the short version of target $T_1$ (L=4cm), the optimum intensity on $T_1$ is $2{\cdot}7\text{-}3\times10^{11}$ protons / pulse which yields $10^6$ particles in our secondary beam. More protons on $T_1$ is a waste for our beam. If the 40 cm $T_1$ target is used the proton transmission efficiency drops by a factor 3 and our $\Sigma^-$ and $\Xi^-$ fluxes drop by the same factor. To minimize the time lost in tuning and checking the apparatus at the beginning of each run, we would like to run over complete 20 day periods in 1978, instead of the half period system we have used in 1977.

3. Further requests for machine time

We will propose in the near future two additional runs on $\Omega^-$ decays and on $\Sigma^- \to n e^- \bar{\nu}$.

$\Omega^-$ decays: According to our present estimate a 20 day run ($5 \times 10^{16}$ protons) would yield 400-800 $\Omega^- \to \Lambda^0 K^-$. The efficiencies for the other decay modes have not been estimated. It is worth mentioning that various estimates of the $\Omega^-$ semileptonic branching ratio give values of $\sim$1% or more. The $\Omega^-$ run would yield the first measurement of that branching ratio.

$\Sigma^- \to n e^- \bar{\nu}$: The two high statistics experiments on that decay give values for the form factor ratio $|g_A/g_V|$ which differ by more than three standard deviations. In our experiment we are already measuring $\Sigma^- \to \Lambda e \nu$, $\Xi^- \to \Lambda e \nu$ and $\Lambda^0 \to p e \nu$ and a 10 day run ($2 \cdot 5 \times 10^{16}$ protons) would yield about 5000 $\Sigma^- \to n e \nu$ in the same apparatus.

1 day running = 2 [illegible]