

CERN LIBRARIES, GENEVA



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MEMORANDUM

To: The members of the EEC

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Subject: Letter of intention

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We intend to send a proposal, in October 1970, to measure the differential cross-section of the reaction $\pi^-p \rightarrow K^+\Sigma^-$ in the incident momentum range 4 to 8 GeV/c.

PHYSICAL AIM

There is an extensive literature on Regge cuts, both theoretical and phenomenological. Regge cut phenomenology has become important since the discovery of a non-zero polarization in the charge-exchange process $\pi^-p \rightarrow \pi^0n$ which cannot be explained by the dominant Regge pole contribution itself (predicting a zero polarization). It has also applied to various other processes (e.g. pion exchange). The cuts introduced up to now were almost exclusively of the type "Pomeron \times Regge". As Phillips has pointed out already in 1967, a direct way to investigate cuts of the "Regge \times Regge" type is to study processes which proceed through an exchange of "exotic" quantum numbers. That is why we have the intention to propose an experiment to measure the differential cross-section $d\sigma/dt$ at small $|t|$ for a reaction of this type, namely

$$\pi^-p \rightarrow K^+\Sigma^- \quad (K^+ \text{ forward}),$$

where the t channel is exotic with $S = 1$, $I = 3/2$. Here the leading term (in the absence of exotic trajectories) is expected to be a Regge \times Regge cut contribution.

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This experiment will be designed to collect a number of events ≥ 1000 for a cross-section $\geq 6 \times 10^{-2}$ μb . In order to obtain the energy dependence of the cross-section (which is the only feature one can roughly estimate theoretically now) we want to measure two points: one around 4 GeV/c and the other in the range 7-8 GeV/c.

EXPERIMENTAL METHOD

Our apparatus will essentially consist of

- a) a telescope: counters + proportional (Charpak) chambers,
- b) a hydrogen target surrounded by a hodoscope of counters sensitive to both charged particles and γ -rays,
- c) a spectrometer made of proportional (Charpak) chambers associated with a 2 m standard magnet,
- d) a set of Čerenkov counters behind the magnet used to identify the K^+ .

NEEDS FROM CERN

In order to perform this measurement we will request from CERN:

- a) a standard two-metre magnet,
- b) a π^\pm beam of 10^6 π^- per burst, working in the energy range 4-10 GeV/c. The π^+ will be used during a short period to calibrate the apparatus with the well measured reaction $\pi^+p \rightarrow K^+\Sigma^+$.

BEAM REQUEST AND TIME TABLE

Our beam request will be:

- i) 3 weeks for testing the whole apparatus,
- ii) 7 weeks for data taking.

Following the proposal in October 1970, if a positive decision is taken by the EEC before the end of 1970, we will be ready to install the whole apparatus and start the tests at Easter 1972.

NOTE

We are now calculating the possibility of measuring at the same time the reaction

$$\pi^-p \rightarrow d\bar{p} \quad (\text{with the deuteron forward})$$

where the t channel is also an "exotic" ($B = 2$) state.