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CERN/TC/COM 65-4
26.1.1965

CM-P00074005

Proposed Program of the CERN-Brussels K^+ Collaboration

Further to our study of 3, 3.5 and 5 GeV/c K^+ p interactions, we have asked for extension of these investigations in three directions :

- a) increase of statistics at one of these energies (proposal T 99)
- b) study of K^+ n interactions at 3 or 3.5 GeV/c (T 52)
- c) study of K^+ p interactions at ~ 10 GeV/c (T 77).

The analysis of the 3, 3.5 and 5 GeV/c runs being now essentially completed, we can now make this program more precise :

- a) Extension of the K^+ p experiment at medium energy (study of the KK, $K\pi$ and $K\pi\pi$ systems).

We choose the momentum of 5 GeV/c for two reasons :

- i) All phenomena present at 3 GeV show up also there; the rather small decrease of cross-section for 3-body systems is more than compensated by the abundance of 4 and 5-body systems.
- ii) The pictures could be done rather soon in a big chamber, for example, the 2m chamber, via the O6 beam. We ask for 250,000 pictures with 15 particles/picture; this would give, for instance, some 200 $KK\Lambda$ and 800 $KK\Lambda\pi$ (instead of present totals of 100 and 100). Also, the new 1,400 $K\pi$ resonance would be represented by about 300 events.

- b) Experiment on medium-energy K^+ 's in deuterium.

Such an experiment has been required also by the Vienna and Munich groups. 300,000 pictures with 15 particles/picture in the Saclay chamber via the m_5 beam at 3.5 GeV/c would allow a good study of, for instance :

- i) The final state $K^x\pi$ (exchange of a charged particle, instead of a neutral particle, like in $K^{\pm}\pi$).
- ii) The new K^{xx} in the final states $K^+\pi^-p$ (no N^{xx} interference, as in $K^0\pi^+p$)¹⁴⁰⁰ and $K^0\pi^-\pi^+p$, $K^+\pi^+\pi^-n$, $K^+\pi^-\pi^-\pi^+p$ (assumedly favoured reactions if K^{xx} has I-spin 3/2).
- iii) The final states $\Lambda^0 K^0 K^+$ and $\Lambda^0 K^+ K^+ \pi^-$ (whereas on protons, we get $\Lambda^0 K^+ K^+$ and $\Lambda^0 K^+ K^0 \pi^+$). For this last type, the number of events expected lies between 50 and 100 for each category, so the proposed run should be considered as exploratory.

- c) We are still willing to participate in a high energy K^+ experiment in the R.F. beam and B.N.B.C. If this were not feasible, we would maintain this proposal for future opportunities.