Several experiments proposed to the Physics III Committee last year need stopped K⁻ mesons. At the moment, there exists no beam at CERN suitable for these experiments.

We propose here a compact and simple lay-out for such a beam, which allows a good separation between π⁻'s and K⁻'s and is at the same time very short (total beam length 9 m), a fact which yields a minimum loss by decay in flight.

The lay-out of the beam and its characteristics are shown in the attached drawing. The beam will operate as follows: Particles of 700 MeV/c are selected by the first half of the bending magnet and focussed by the quadrupole lenses $q_1$ and $q_2$ into the momentum slit in the middle of the magnet. The particles are slowed down in 50 g/cm² of carbon, placed in the momentum slit. The π⁻'s leave the carbon with 600 MeV/c, the K⁻'s with 540 MeV/c momentum. Due to the 10% difference in their momenta, π⁻'s and K⁻'s will then be separated by the bending in the second half of the magnet. The quadrupoles $q_3$ and $q_4$ focus the K⁻'s at 4.5 m from the momentum slit. At this distance, the π⁻ focus will be displaced by ~ 15 cm from the K⁻ focus.

The rms multiple scattering angle of the K⁻'s in the carbon moderator, $\Delta \theta_{\text{rms}} \sim 35$ mrad, is of the same order as the acceptance of the first part of the beam. Multiple scattering will therefore not cause a sizeable loss.

The interaction loss in the moderator is not a disadvantage compared to a conventional beam with a separator, as the kaons will be stopped in any case.

In order to test the separation power of such a system, we measured the momentum distribution of 700-MeV/c π⁻, passing through 50 g/cm² of carbon. At
540 MeV/c, the number of $\pi$'s observed in a momentum band of $\frac{\Delta p}{p} = \pm 3\%$ was 3% of the $\pi$'s contained in the peak at 600 MeV/c.

From $K^-$ at 700 MeV/c, 10% can be brought to rest, the others being lost through interactions in the moderator (experimental, private communication by A. Minten).

In the beam lay-out proposed here, 85% of the $K^-$ would decay in flight between the production target in the PS and the experimental target. Therefore, 1.5% of the $K^-$ falling into the solid angle and the momentum bite accepted by the beam can be stopped in the experimental target.

The possibility of installing the proposed beam at target B in addition to the planned m and q beams is under study. For a production angle of 600 mrad, which could be achieved without interfering with the other beams, and at 19 GeV PS energy, about 3000 $K^-/10^{11}$ protons fall into the solid angle and the momentum bite accepted by the beam (Hagedorn, private communication), giving rise to 45 $K^-$ stopped in the experimental target per $10^{11}$ protons on the production target.

This beam is intended to be used for work on hypernuclei and on $K^-$-mesic X rays. The Heidelberg-Karlsruhe Group (Backenstoss et al.) has expressed strong interest in this beam.

We are grateful to Professor B. Gregory who suggested a study of this kind of beam lay-out for the production of stopping $K^-$ mesons.
Layout of KX beam from target 8.
Optical diagram of Kx beam.

Angular acceptance: \( \Delta \phi \lesssim \pm 17 \text{ mrad} \)
\( \Delta \nu \lesssim \pm 62 \text{ mrad} \)

Total length: 9 m

Maximum momentum: 800 MeV/c

Momentum dispersion at 1/10: 4.8 mm/\( \% \Delta p/\% \)

All quadrupoles with 20 cm aperture; maximum gradient:
B11 (C type)
\( B_{11} = 4 \text{ cm} \)
\( \gamma = 15 \text{ Kev} \)

29/11/5?