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ANALYSIS OF THE K- BEAM TRANSMITTED BY THE MURRAY SPECTROMETER

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ANALYSIS OF THE K^- BEAM
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THE MURRAY SPECTROMETER

John N. Dyer

January 27, 1959

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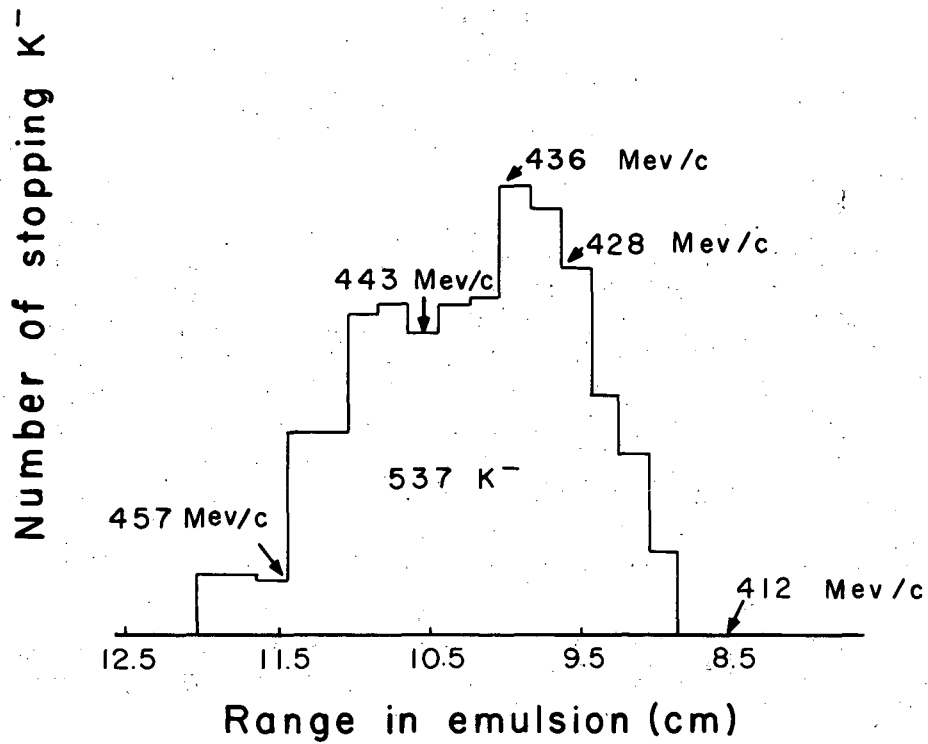
From November 27 to December 1, 1958, we exposed a second stack to the K^- beam separated by the coaxial velocity spectrometer.¹ This stack consisted of 216 pellicles of K. 5 emulsion, each 6×9 inches by 600μ . The exposure was similar to the one previously reported² but in this experiment the momentum was about 10 Mev/c greater, with a corresponding change in the focal length of quadrupole Q-2. The face of the stack was about 8 inches behind the aperture of collimator C-2 and the stack was oriented so that the beam entered parallel to the 9-inch axis. Shielding, including 1/4-inch Pb over the face of the stack, was the same as in the earlier exposure.

The area in which K^- particles come to rest has been scanned in several of the pellicles near the center of the stack. The range distribution thus obtained is shown in Fig. 1. The momentum points indicated on this figure have been calculated from the range in emulsion plus 1/4 inch of Pb.

The flux of near-minimum-ionization particles has been counted to obtain the horizontal distribution of the beam. This is shown as Fig. 2. Tracks of about twice minimum ionization were counted separately at the region of greatest incident flux; if we assume that these are K^- tracks, we obtain a value for the ratio of "minimum" tracks per K^- track. However, since the K^- beam is presumably more sharply focused than the beam of background particles, and since twice-minimum tracks are not always K^- tracks, this ratio represents an optimum value, and the average ratio over the exposed face of the stack is probably only about half as favorable.

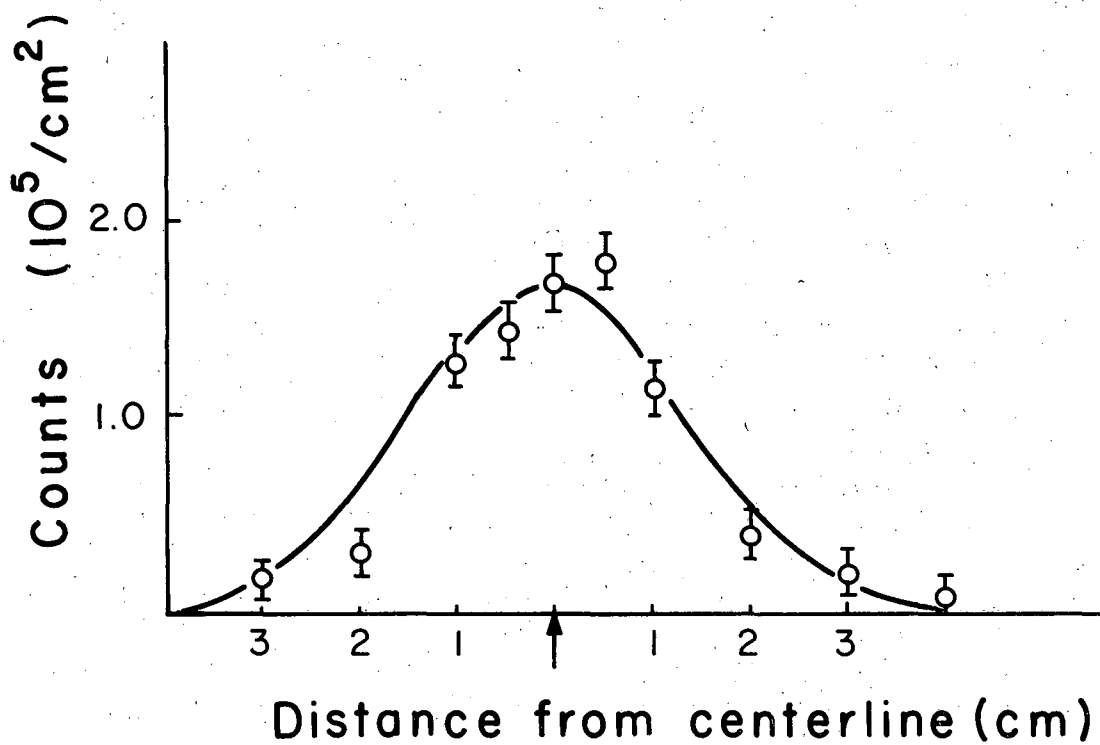
¹Horwitz, Murray, Ross, and Tripp, 450-Mev/c K^- and $\bar{p}$ Beams at the Northwest Target Area of the Bevatron Separated by the Coaxial Velocity Spectrometers, UCRL-8269, June 1958.

²John N. Dyer, Analysis of the Bevatron K^- Beam by Means of an Emulsion Stack, UCRL-8364, July 1958.



MU-16657

Fig. 1. Range distribution of K^- mesons.



MU-16656

Fig. 2. Horizontal distribution of the beam.

The exposure data, and our results derived from the scanning we have completed to date, are as follows:

1. protons on target ³	7×10^{14}
2. area at face of stack exposed	$\sim 11 \text{ cm}^2$
3. average flux of near-minimum-ionization tracks over exposed area	$\sim 1 \times 10^5 \text{ cm}^{-2}$
4. total number of near-minimum tracks entering stack	$\sim 11 \times 10^5$
5. ratio of near-minimum tracks per K^- track at center of beam	~ 50
6. assumed average ratio	~ 100
7. number of K^- particles entering stack (assuming 100 minimum per K^-)	$\sim 11,000$
8. number of K^- particles coming to rest: we estimate an average of 120 particles per pellicle in the central 40 pellicles--we have not investigated pellicles further from the beam centerline.	$\sim 5000 K^-$ (40 pellicles)
9. protons on target per K^- in stack	$\sim 6 \times 10^{10}$
10. momentum of beam	see Fig. 1

³It is understood that there are two targets that can be used to produce this beam. This was not known at the time of exposure and no record was kept to indicate which target was used.

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