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Now that K mesons are available in large numbers from proton [illegible] trons, experiments will soon yield precise values for the lifetime, or [illegible] times, of the K mesons. Exposures of emulsions to K particles have [illegible] made by several groups at Berkeley, under quite different conditions, [illegible] as distance from the target and magnetic resolution are concerned. [illegible] knew the relative integrated currents on the targets for exposures with [illegible] and short flight paths, and if geometrical and resolution factors were [illegible] taken into account, these experiments would yield a lifetime. Until [illegible], such an intercomparison of the results has appeared impossible. [illegible] has now been found to tie the results of the various experiments together [illegible] note describes the method and presents the lifetime so determined.

The earliest exposures[1,2] were made in a re-entrant well with [illegible] magnetic resolution, 90° to the target at a distance of about 11 1/2 inches. One set of exposures was carried out in a well which had a 0.1-inch aluminum window and another in a well which had 1-inch aluminum window. Later [illegible] was done at a distance of about 106 inches from the target with magnetic [illegible] tion.[3] The "well exposures" yielded a total of 10 τ mesons from all [illegible] in the laboratory. All groups tabulated the number of K_L and τ mesons [illegible] ping at a range corresponding to a momentum of about 350 ± 15 Mev/c, [illegible] number of all π mesons stopping at the same range. We have also [illegible] in the stack exposed in the well that had a 0.1-inch aluminum window [illegible] number of 350 ± 15 Mev/c protons and the number of π mesons that [illegible] at the range corresponding to 350 ± 15 Mev/c K mesons. In the well [illegible] silver, lead, and brass targets were used. The ratio of stopped [illegible] protons, determined in the above exposures, was independent of the [illegible] The measurements of this ratio cannot be done for the exposure in [illegible] that had the 1-inch aluminum window, since the desired protons stop [illegible] [illegible] a total of about 60 τ mesons from all groups in the laboratory [illegible] the ratio of τ mesons to protons of 350 Mev/c at two distances (times of flight - slowing-down time: 1.8×10^{-9} second and 1.3×10^{-8} second, [illegible] spectively), which yields a mean life for the τ mesons of

$$\tau_{\tau} = 1.6 \begin{smallmatrix} +1.2 \\ -0.7 \end{smallmatrix} \times 10^{-8} \text{ second.}$$

The main contribution to the rms error comes from the small number of τ mesons (10) found in the well exposure.

Unfortunately, the lifetime of the K_L mesons as determined by this method is not trustworthy, even though the statistics are better. The difficulty is that we do not know the scanning efficiency for K_L mesons for the method of scanning used in the well exposure. The efficiency for τ mesons can be assumed to be greater than 0.9, since the τ-meson decay is so easily distinguished.

We wish to thank Dr. Harry H. Heckman and the Richman group for making some of their unpublished results available to us.

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