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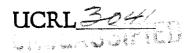
The Lifetime of the Tau Meson

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THE LIFETIME OF THE 7 MESON Luis W. Alvarez and Sulamith Coldhaber June 13, 1953

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Now that K mesons are available in large numbers from protein symmetry, experiments will soon yield precise values for the lifetibles, the lifetible lifetibles, the lifetibles, the lifetibles, the lifetible lifetibles, the lifetible lifetibles, the lifetible lifetibles, the lifetible lifetible lifetible lifetible lifetible lifetible, l

The earliest exposures (1, 2) were made in a re-entrant well with the magnetic resolution, 90° to the target at a distance of about 11 1/2 inclusion One set of emosures was carried out in a well which had a 0.1 date advector window and another in a well which had 1-inch aluminum window. Letter not • was done at a distance of about 106 inches from the target with momentary to a tion. (3) The "well exposures" yielded a total of 107 mesons from all group In the laboratory. All groups tabulated the number of Kg and mountain ping at a range corresponding to a momentum of about 350 + 15 Mewler, self is number of all a mesone stopping at the same range. We have also contact. to the stack exposed in the well that had a 0.1-inch aluminum window for worder of 360 a 16 Mev/c protons and the number of strategics data to as the bases corresponding to $350 \pm 15~{
m Mev/c}$ M mesons. To the well ender st stiver, lead, and brass targets were used. The ratio of storyad students nerrors, determined in the spare expession, was independent of the The measure cents of this ratio cannot be done for the subacture in a han best lies i straik **alarminum windem, alue - the dea**med prove to stop, to the le element odrohues. Maint 1966 - menodadea es san tañaro, encodo de comercia , e 1999 e 1999 e casa de Cas Best 🗹 🖓 - Servi e comme

a total of about 60 7 mesons from all groups in the laborators d = 0.0000the ratio of τ mesons to protons of 350 Mev/c at two distances (protoof flight - slowing-down time: 1.8×10^{-9} second and 1.3×10^{-9} econd spectively), which yields a mean life for the τ mesons of

 $7 = 1.6 \frac{+1.2}{-0.7} \times 10^{-8}$ 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} determined by this method is not trustworthy, even though the statistics are better. The difficulty is deterwe 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 assure 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.

This work was done under the suspices of the U.S. Atomic Energy Commission.

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