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A MEASUREMENT OF THE μ^- CAPTURE RATE IN HELIUM BY THE ROME HELIUM BUBBLE CHAMBER GROUP

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The capture rate of μ^- in Helium has been computed by Primakoff[1] to be 4.7×10^2 sec^{-1}. A recent measurement by Anderson et al.[2] indicates a value much greater of 1.3×10^3 sec^{-1}. Such a high value would be very difficult to explain since, as it has been shown by Bietti[3], the theoretical value is affected only very little by the uncertainties on the nuclear wave function of He^4. A precise measurement of the capture rate could be easily done with a Helium bubble chamber: the counter results could then be best used to give information on the neutron spectrum and multiplicity. We propose to use for such a measurement the Helium bubble chamber of the University of Rome, which is presently at CERN.

If the capture rate is the one predicted by Primakoff, we should have one capture in 1000 decays. Since we can expect to stop 10 μ^-/picture, a total of 50000 pictures would yield about 500 captures.

The captures will not give rise to visible recoil, and they will be detected because of the absence of the decay electron. If the π^- contamination in the beam is of the order of 0,3 o/o we should expect about 1500 π^- captures, but they will give rise in most cases ($>$90 o/o) to a visible star. A short exposure to a π^- beam will allow a determination of the number of zero prong stars due to π^-.

The same target and beam lay out prepared for the experiment on μ^- capture in H_2 should be used. The experiment could probably be done in the second half of November. About two days of parasitic SC time would be necessary.

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(1) H. Primakoff, Rev. Mod. Phys. vol. 31, p. 802.

(2) Anderson, Hincks, Johnson, Ray, Segar. Conférence d'Aix-en-Provence.

(3) A. Bietti, Nuovo Cimento, vol. 20, pg. 1043.

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