FURTHER SEARTH FOR THE $\mu^+ \to e^+ + e^+ + e^-$ *DECAY* [1)]

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IN the authors' previous paper [1] a search was made for $\mu^+ \to e^+ + e^+ + e^-$ decay with the aid of apparatus comprising a combination of fast electronic circuitry and spark chambers. Not a single $\mu \to 3e$ event was observed, and the upper possible limit for the fraction of this process was set at $\rho < 2.6 \times 10^{-7}$ if the matrix element of the process can be considered constant, and at $\rho > 2.0 \times 10^{-7}$ if the influence of the matrix element is considered in second order of perturbation theory.

In the present letter we report new results of an investigation of the $\mu \to 3e$ decay. The experiment was carried out with the apparatus previously described (see [1]). Compared with the previous measurements, the statistics were doubled and now correspond to 1.38×10^9 stopped muons in the target.

In order to be able to classify the events registered by the setup as $\mu \to 3e$ decays, they must satisfy several kinematic and other criteria, formulated in our earlier paper. Not a single event of this type was observed during the total measurement time (~ 150 h).

By means of additional calibration measurements and calculations with an electronic computer, we obtained more precise values for the efficiency of registration of the $\mu \to 3e$ decay with our apparatus. The total efficiency (with allowance for counter inefficiency etc) is $\epsilon = 0.012$ if the matrix element of the $\mu \to 3e$ process is considered constant, and $\epsilon = 0.014$ if the matrix element has the form $|M|^2 = \text{const} \cdot \epsilon_3(1 - \epsilon_3)$, obtained in second order perturbation theory (ϵ_3 is the e^- energy). Under the first assumed form of M, calculation by means of the Poisson formula gives with 90% confidence $\rho < 1.45 \times 10^{-7}$, while the second assumption yields $\rho < 1.25 \times 10^{-7}$.

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1)Reported at the Eleventh International Conference on High-energy Physics in Geneva, July, 1962.

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1 Babaev, Balats, Kaftanov, Landsberg, Lyubimov, and Obukhov, Preprint, Inst. Theoret. Exptl. Phys., 1926; JETP **42**, 1685 (1962), Soviet Phys. JETP **15**, 1170 (1962).

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