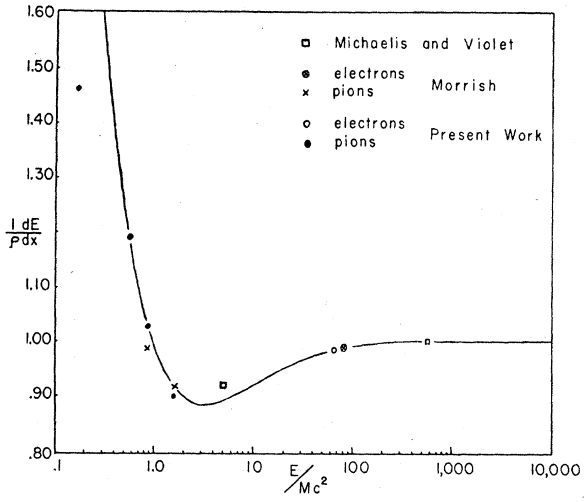

FIG. 1. Theoretical curve of energy loss in AgBr in Mev per gram per cm² as a function of E/Mc^2. Blob densities are plotted and normalized to the curve at the points for the decay electrons in the present investigation and that of Morrish. The data of Michaelis and Violet are normalized to the curve for their point at $E/Mc^2=580$.

Similar type experiments over restricted portions of the curve have been made at Berkeley[6] and by Morrish,[7] and these data have been included in Fig. 1. The points, Fig. 1, appear to be in reasonable agreement with the theoretical curve; however, the agreement between both the theory and the different observers would be quite good if all statistical errors were doubled. It is probable that this is due to some systematic errors, the nature of which are not known at present.

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Negative μ-Meson Capture in Carbon*

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WE are studying experimentally the behavior of cosmic-ray μ mesons stopped in carbon. Bell and Hincks[1] have shown that the mean life of negative μ mesons in carbon differs from the mean life of positive μ mesons. They compute the nuclear capture rate for negative μ mesons in carbon to be $A=(5.5\pm1.5)\times10^4$ sec^{-1}. The fraction of stopped negative μ mesons which are captured, $F=A/(A+1/\tau)$, is 0.11 ± 0.03, where τ is the mean life of positive μ mesons. The possible end products of the capture reaction are bound states of B^{12} or groups of fragments such as B^{11} plus a neutron. The object of our investigation is a determination of the probability for the end product to be B^{12} in its ground state. We present here a brief description of the method and some preliminary results.

The μ mesons to be studied are stopped in an organic liquid scintillation counter. The counter has a sensitive volume of 4 in.$\times4\frac{1}{2}$ in.$\times5$ in. viewed by two RCA type *C*7157 photomultipliers. The pulses from the counter are presented on an oscilloscope and photographed. An arrangement of coincidence and anticoincidence Geiger counters selects events and triggers the oscilloscope sweep. Details of the presentation scheme and of the means used to eliminate spurious events will be presented in a subsequent paper.

Two types of events are investigated. In the first, the pulse from the arriving μ meson is followed by a pulse with a 2 μsec mean delay, indicating that the meson decayed. In the second type of event, the arriving μ-meson pulse is followed by a pulse with a 39 millisecond mean delay, indicating that a C^{12} nucleus captured the meson, forming a B^{12} nucleus which subsequently decayed by β emission back to C^{12}.[2] The end product of the capture reaction in the second type of event is B^{12} in either the ground state or a bound excited state. (An unbound excited state would decay by neutron emission and a B^{12} β particle would never be observed.) A bound excited state would promptly decay by γ emission to the ground state and later a β particle would be emitted. With the present apparatus, the γ ray would in general not be detected, and the event would have the same appearance as if the ground state had been formed in the original capture reaction.

Let D be the number of events observed in which a negative meson decays, as determined from the total number of decays, corrected by the data of Bell and Hincks and by the known positive excess. Let C be the number of capture events observed. Then $P=C/D\tau$ is the rate of the μ-meson capture reaction that results in a B^{12} nucleus in the ground state or in a bound excited state. P is thus also an upper limit on the rate of the reaction whose end product is B^{12} in the ground state. Our preliminary result is that $P=(5\pm2)\times10^3$ sec^{-1}.

The ratio P/A is 0.09 ± 0.05. This indicates that only about a tenth of the capture reactions result in B^{12} in a bound state. If the unbound states of B^{12} usually break up into B^{11} plus a neutron, then from the low value of P/A one would expect the multiplicity of the neutrons emitted in the capture of μ mesons in carbon to be near unity. Although the neutron multiplicity has been measured[3] for the capture of μ mesons in several elements, it has not yet been done for carbon.

A full report will be published upon completion of this investigation.

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Liquid Scintillation Counting of Natural C^{14}†

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DURING an investigation of the natural C^{14} content of liquid scintillation solvents, samples of *p*-cymene were obtained which gave very different counting rates. A consistently high rate resulted from material whose primary origin, via certain trees, was contemporary atmospheric carbon dioxide[1] and an equally consistent low value was derived from samples synthesized entirely from petroluem chemicals.[2]

Accurate knowledge of these two counting rates and the accompanying backgrounds, along with careful standardization of the C^{14} detection efficiencies during the experiments, has allowed easy realization of a number which is the specific activity of natural C^{14} in *p*-cymene and in the constituents of turpentine from which it is derived.