In this notation, the isotopic spin no longer appears explicitly in Heisenberg's and Majorana's operators,

$$P^H = \tfrac{1}{2}(1 - {}^1\beta \cdot {}^2\beta) \cdot {}^1\tau \cdot {}^2\tau$$
$$P^M = \tfrac{1}{2} \cdot P^H + \tfrac{1}{2}(1 - {}^1\beta \cdot {}^2\beta) \cdot {}^1\boldsymbol{\alpha} \cdot {}^2\boldsymbol{\alpha}.$$

This representation of nuclear forces, however, does not furnish an indication how to obtain a relativistic generalization of our formulae. In particular, it does not show whether a relativistic theory of the nucleon can be built without introducing four more states (antiproton and antineutron).

The Retraction of Stretched Rubber

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March 31, 1944

FOR some time we have been making measurements of the velocities acquired by rubber strips when retracting after being stretched. The rubber band is stretched in front of two photo-cells, cutting off two sharply focused light beams. When the strip is released, the beams impinge successively on the photo-cells, the first of which starts the charging of a condenser, and the second of which stops the charging current. The resulting voltage on the condenser is thus a measure of the time required for the free end of the rubber strip to traverse the distance between the two light beams. Retraction velocities of the order of several hundred miles per hour have been observed.

To explain some of our results and to secure a more detailed picture of the mechanism of retraction, we have also taken pictures of retracting rubber strips with a high speed stroboscopic lamp. These seemed to be of sufficient general interest to present here.

Parallel, equidistant lines were ruled across the strips before they were stretched. The spacings of these lines were then measured in the photographs of the retracting strips to study the local elongation at any point during the retraction.

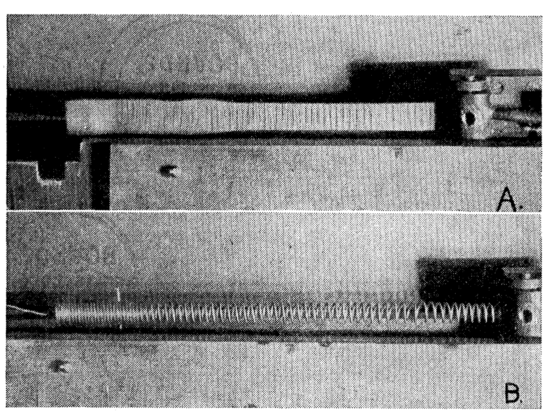

FIG. 1. High speed photographs of a freely retracting rubber strip and a steel spring. *A*, Hevea gum stock; *B*, steel spring.

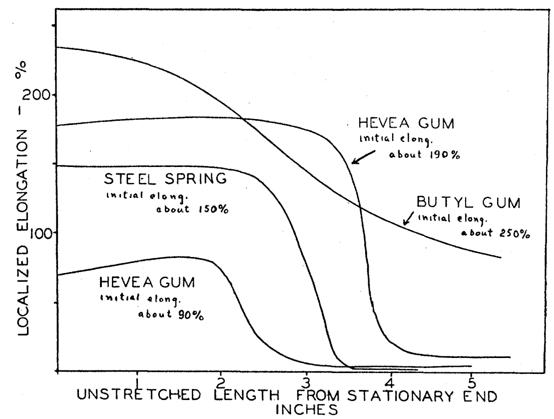

FIG. 2. Curves showing the wave front for free retraction. Local elongation obtained from photographs plotted against the normal length.

The photographs show that a rubber stock having low internal friction, such as a Hevea rubber cured gum stock, retracts very much like a steel spring. The retraction starts at the released end and progresses in a wave until it reaches the stationary end. This effect is shown in the photographs of Fig. 1 and also by the measurements of local elongation taken from the photographs which are plotted in Fig. 2.

It is interesting to note that the sharpness of this retraction wave front is dependent on the internal friction of the elastic material. Butyl rubber gum stock shows practically no wave front but merely a progressively lower elongation along the strip.

It is planned to publish a complete description and the results of the experiments at an early date.

The Method of Shower Anticoincidences for Measuring the Meson Component of Cosmic Radiation

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March 4, 1944

THE meson intensity measured in counter experiments where absorbers are used to filter out the soft electronic component refers only to fast mesons. The slow mesons which get cut out by the absorber can so far be estimated only indirectly, as, for instance, by the method adopted by Auger[1] and Greisen.[2] There is evidence, however, that the proportion of slow mesons increases rapidly with altitude, and it would be of great advantage if there were a direct method for measuring the total meson intensity. Bhabha[3] has recently suggested on grounds of reducing the weight of lead carried by balloons measuring the meson intensity in the stratosphere that the production of secondaries by the electronic component can be used to advantage in cutting them out. But this principle could be used for the more important purpose of bringing for the

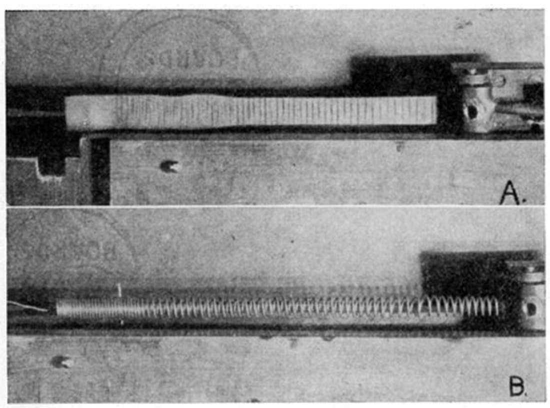

FIG. 1. High speed photographs of a freely retracting rubber strip and a steel spring. *A*, Hevea gum stock; *B*, steel spring.