The corrections to SF have been obtained as a function of energy to energies well above pion threshold by this convergence procedure. A further, and important, correction to SF, namely the inclusion of the absorptive part of the scattering, has also been introduced in these calculations. For the purpose of comparison with the results of SF, the newly calculated total scattering of gamma rays by neutrons is shown in Fig. 1 along with

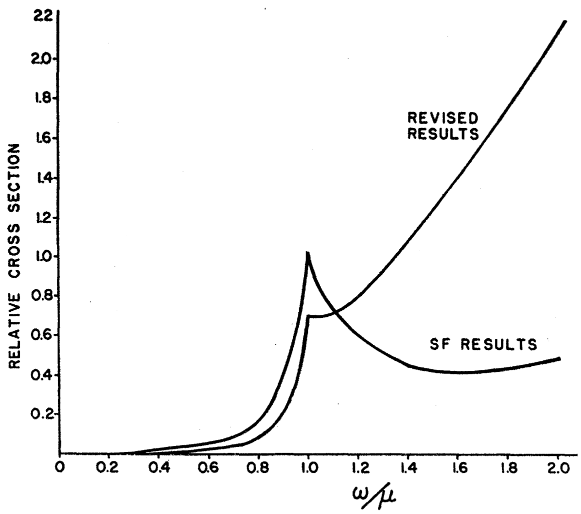

FIG. 1. Total cross section for scattering of gamma rays by neutrons calculated in weak-coupling, no-recoil, pseudoscalar meson theory. Results obtained by SF (see reference 2) are also given for comparison. The energy is given in units of the pion mass, the absolute cross section is proportional to g^4, and the above values are given in units of the Thomson cross section for $g^2/\hbar c = 0.116$.

the old results. The neutron was used for this purpose since the shape of the curve is independent of the choice of coupling constant. That is not the case for the proton because of the interference between Thomson and mesonic scattering. It is to be borne in mind that this is a weak coupling calculation carried only to order g^4 in the meson-nucleon coupling.

The energy dependence of the total cross section of the proton shows an equally important change from the curve obtained by SF, as does the differential cross section. These results will soon be submitted for publication along with a detailed discussion of both the general arguments and the method of calculation.

* This work supported in part by the U. S. Atomic Energy Commission and in part by the University of Wisconsin Research Committee with funds provided by the Wisconsin Alumni Research Foundation.

† National Science Foundation Predoctoral Fellow.

[1] R. G. Sachs and N. Austern, Phys. Rev. **81**, 705 (1951).

[2] R. G. Sachs and L. L. Foldy, Phys. Rev. **80**, 824 (1950). Referred to as SF.

[3] The fact that this term probably should not occur has been pointed out to the authors by Foldy, Kroll, and Goldberger in discussions at Brookhaven National Laboratory.

Nuclear Spin of Np^{239}†

JOHN G. CONWAY AND RALPH D. MCLAUGHLIN
Radiation Laboratory, University of California, Berkeley, California
(Received August 20, 1954)

MICROGRAM quantities of Np^{239}, a 2.3-day beta-gamma activity, were produced by a neutron irradiation of uranium in a high-flux pile. The chemistry used to separate the neptunium from the uranium was an extraction of the Np^{+4} ion into a TTA (thenoyltrifluoroacetone) benzene phase. The intense radiations of the neptunium produced enough peroxide to interfere with the separation, however, sufficient Np^{239} was obtained to conduct the experiment. The Np^{239} was also radiochemically identified and assayed.

The Np^{239} was evaporated on a $\frac{1}{4}$-inch graphite electrode and arced at 15 amperes dc. Neptunium-237, a graphite blank, and an iron arc were photographed for comparison. The spectra were photographed in the second and third order on a 21-foot Paschen-Runge mount with a 30 000-line/inch grating.

The hyperfine pattern of Np^{239} showed two lines and, thus, a spin of $I=\frac{1}{2}(h/2\pi)$ can be assigned to this isotope. The Np^{237} comparison spectrum showed the six-component flag pattern as reported by Tomkins.[1]

The neptunium line at 3999.5A was the best-resolved and widest line observed. The distances from the centers of the first and last components of the line are in the ratio of 1 to 6.9 (± 0.1) for Np^{239} to Np^{237}.

We wish to acknowledge the help of Dr. J. C. Wallmann and Professor B. B. Cunningham, and also the Health Chemistry Department of the Radiation Laboratory, particularly D. Martin, Jr., J. E. Anderson, and T. C. Parsons. We are also indebted to Professor F. A. Jenkins of the Department of Physics of the University of California for the use of the spectrograph and to Dr. G. H. Higgins for the radiochemical assay.

† This work was performed under the auspices of the U. S. Atomic Energy Commission.

[1] F. S. Tomkins, Phys. Rev. **73**, 1214 (1948).

Possible Existence of a New Hyperon*

Y. EISENBERG†
Laboratory of Nuclear Studies, Cornell University, Ithaca, New York
(Received August 26, 1954)

AN unusual event has been found in a stack consisting of 42 Ilford G-5 400-μ stripped emulsions flown for $6\frac{1}{2}$ hours at approximately 100 000 ft from Goodfellow Air Force Base, Texas (41°N geomagnetic latitude). The event is shown in Fig. 1. Particle K_2 comes to rest in the emulsion and gives rise to a star containing 5 visible prongs. Of these 1, 2, and 3 are protons of 1.0, 5.5, and 0.5 Mev, respectively. Track No. 4 is a 29-Mev alpha particle, and the light track L