forward production from carbon and hydrogen will be presented.

* This work was supported by the AEC.
[1] C. Richman and H. A. Wilcox, Phys. Rev. (to be published).
[2] M. Weissbluth, Phys. Rev. (to be published).

B11. Energy Loss of Million-Volt Electrons. ROBERT D. BIRKHOFF,* EARL E. HAYS,† AND S. A. GOUDSMIT,† *Northwestern University.*—A line source of a beta-active substance was placed parallel to the lines of force in a vertical homogeneous magnetic field. The electrons were restricted by baffles to move along helical paths of 10.75 to 11.25 cm radius. Thin foils were placed in their path at 180° from the source. The displacement of the linear focus at 360° was measured photographically and with counters. A counter was placed 12.8 cm below the source along the lines of force. It could be moved radially and the position of maximum intensity was observed. These measurements give the most probable, rather than the usual, average energy loss. By varying the field, the kinetic energy of the selected electrons was varied from 0.25 to 1.5 Mev. The following foils were used: Be (16.0 mg/cm²), Al (4.7, 14.0, and 37.0 mg/cm²), Ag (5.35 and 10.5 mg/cm²), Ta (10.0 mg/cm²). Comparison with the theory of Landau for the most probable energy loss shows reasonable agreement. Facilities of Argonne National Laboratory were kindly put at our disposal for this work.

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† Now at Brookhaven National Laboratory, Upton, Long Island, New York.

B12. Search for Gamma-Rays from Nuclei Exposed to Synchrotron Radiation.* J. C. KECK, M. STEARNS, AND R. R. WILSON, *Cornell University.*—An investigation is being made of the production of energetic gamma-rays by nuclei in the photon beam of the synchrotron. Two scintillation counters so placed that the beam passes between them are used as the energy sensitive detectors. The counters consist of activated NaI crystals, each 4 cm in diameter and 5 cm long, facing photo-multiplier tubes. The crystals can be surrounded by 2 r.l. of lead to increase the efficiency at high energies. By adjusting a discriminator bias, the energy threshold can be changed from about 10 to 100 Mev. Calibration has been made against the γ-rays of Co, Th C″, and the Li(p,γ) reaction. A pulsed light source is used to extend the calibration to higher energies. Good collimation of the primary γ-ray beam results in very low backgrounds at large angles. Individual counts, coincidences, and delayed coincidences (assumed casuals) are recorded. Preliminary measurements at 220 Mev indicate that the cross section for emission of energetic gamma-rays in coincidences from Be is $<10^{-29}$ cm² per nucleus per photon per logarithmic energy interval. More sensitive measurements extending to higher energies are in progress. Single high energy particles are observed but positive identification has not been made.

* Supported by ONR.

B13. Coincidence Efficiency of Gamma-Rays. J. M. BARNOTHY AND M. FORRO, *Barat College.*—Several years ago the authors[1] found at great depth a scarcely ionizing radiation of local origin. Later measurements[2] were also not able to settle definitely the question whether this local radiation is a decay product of the penetrating cosmic radiation, or the gamma-radiation of the surrounding materials. To clear this point, investigations were carried out to determine the dependency of the coincidence efficiency of gamma-rays from the energy of the gamma-rays, from the aperture of the coincidence equipment, from the material and wall thickness of the G-M counters, and from the circumstance that the gamma-ray source emits one or two gamma-rays simultaneously. The experiments were sponsored by a grant of Research Corporation.

[1] J. Barnothy and M. Forro, Phys. Rev. **55**, 870 (1939).
[2] J. Barnothy and M. Forro, Phys. Rev. **74**, 1300 (1948) and Miesowicz Jurkiewicz, and Massalski, Phys. Rev. **77**, 380 (1950).

THURSDAY MORNING AT 10:00

National Academy

(E. P. WIGNER presiding)

Theoretical Physics

C1. Effect of a Finite Groundplane on Antenna Radiation.* ALFRED LEITNER, *New York University* AND R. D. SPENCE, *Michigan State College.*—The field of a quarter-wave dipole antenna over a circular groundplane is calculated exactly. The Green's function is represented in terms of the oblate spheroidal wave functions, and satisfies approximate boundary conditions on the conducting circular disk of zero thickness and radius a. Thus both the current on the groundplane and the radiation at large distances are found. (Alternatively, one may calculate the current on the groundplane by applying the reciprocity theorem, after Papas and King.[1]) As a is increased, the radiation resistance and the surface current oscillate about the values which characterize a quarter-wave antenna above an infinite groundplane. The radiation pattern, however, is entirely different. The results are in good quantitative agreement with those of recent experiments by Meier and Summers.[2]

* Supported in part by Geophysical Research Directorate, Air Force Cambridge Research Laboratories, A. M. C.
[1] Papas and King, J. App. Phys. **19**, 808 (1948).
[2] Meier and Summers, Proc. I. R. E. **37**, 609 (1949).

C2. Finite Wiener-Hopf Equations. RICHARD LATTER, *Rand Corporation.*—The Wiener-Hopf technique has been applied to obtain solutions for a class of integral equations of the form:

$$\text{(i)} \quad f(x)=\lambda\int_0^a dy K(x-y)f(y)$$

$$\text{(ii)} \quad f(x)=g(x)+\lambda\int_0^a dy K(x-y)f(y).$$

Solutions have been obtained for those cases in which the Generalized Fourier transform* of the kernel $K(x)$ has no essential singularities or branch points. A general class of kernels consistent with these conditions is that in which $K(x)$ is a sum of polynomials times exponentials. The more important problems wherein the transform of the kernel has essential singularities or branch points (as for diffraction by a finite slit or diffusion through a finite slab) have not yet been solved.

* Titchmarsh, Fourier Integrals.