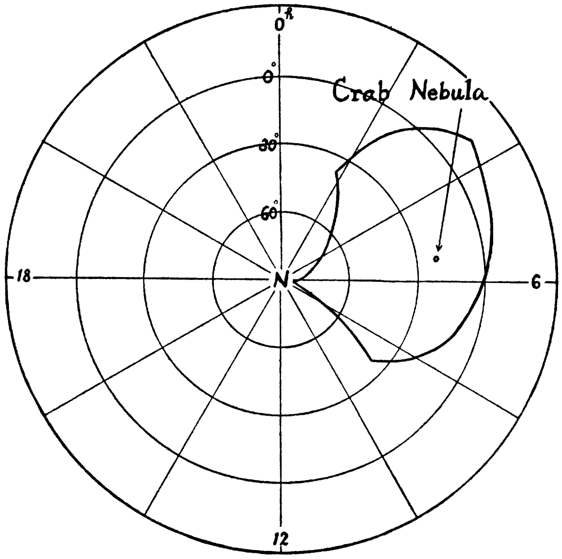

FIG. 2. Projection of the effective solid angle of the instrument on the celestial sphere at 6 hr local sidereal time.

which is a remarkable point source of cosmic noise.[2] Since the distance of the Crab nebula is short and the energy of the rays is high, the deflection of cosmic rays in the galactic magnetic field is negligible. Hence, the above-mentioned assumption is not so unreasonable, if we take the Crab nebula to be the source of cosmic rays. Unsöld,[3] Ryle,[4] and Alfvén *et al.*[5] have theoretically suggested such a possibility. As was shown in Fig. 2, the Crab nebula stays in the solid angle during the period from 2 hr to 8 hr. The intensity of cosmic rays seems to increase in about the same period [see Fig. 1(a)]. The existence of this increase of about 10 percent can be proved with 2 percent significance level.

It must be noticed that there was no considerable effect in cosmic-ray intensity in the directions of Cygnus[6] and other point sources of cosmic noise, which exist on the same latitude band where the instrument has swept. However, the Crab nebula is the most characteristic one among the point sources of cosmic noise, for it is an old supernova and its expansion is still seen.

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Measurement of Nuclear Polarizabilities by Nuclear Scattering Experiments*

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MOST nuclear scattering experiments are performed with such nuclear charges and energies that the scattering is importantly affected either by the direct interaction of the two nuclei through their specifically nuclear forces, or by electric excitation which leads to inelastic scattering. However, it is the purpose of this note to point out that important nuclear data can also be obtained when the elastic scattering of charged nuclei is carefully measured under circumstances such that the scattering is almost exclusively electrical and elastic. In particular, if the nuclei are polarizable, i.e., if they can be distorted by the strong electric fields which arise in the scattering of charged nuclei, the change in the nuclear charge distribution associated with the distortion will modify the electrical scattering and give rise to a departure from the Rutherford scattering law. Such a nuclear polarizability is to be expected according to current nuclear theory and has already been assumed by Breit and Townes to explain some of the phenomena observed in spectroscopic isotope shifts,[1] and in microwave measurements of nuclear quadrupole moments.[2] The scattering experiments suggested in this letter should provide an independent means for measuring the polarizabilities of a number of different nuclei.

The departures from the Rutherford scattering which arise from nuclear polarizabilities are usually small when the direct nuclear interactions and inelastic scatterings are negligible, since the penetrability of the coulomb barrier and acceleration magnitudes must then be kept low. As a result, the classical closest distance of approach of the two nuclei is large and the polarizability interaction potential, which varies as r^{-4}, is small. However, it should be possible to measure the departures in many cases. For example, changes in the Rutherford scattering of a few percent due to nuclear polarizability should be expected with 2.1-Mev deuterons scattered from copper due to the deuteron polarizability, and with 9-Mev C^{12} or 32-Mev Cl^{35} scattered by Cl^{35} due to a Cl^{35} polarizability of the magnitude assumed by Townes.[3] According to present theories,[1,4] the effects of nuclear interactions and inelastic scatterings should be less than the polarization effects, although this would not be true in all cases if one attempted to increase the magnitude of the polarizability effect by considerably increasing the energy of the scattered particle.

Since the electric field in the scattering process is present for only a short time, the nuclei may not respond sufficiently rapidly for them to achieve their full polarization as they would for a static electrical field. However, in most of the cases considered the duration of the pulse is sufficiently long that the problem is at least approximately adiabatic for the internuclear motions. Scattering experiments with different charges and energies of the bombarding nuclei may indicate the frequency dependence of the nuclear polarizability. Likewise, with the strong electric fields and small distances present in scattering, the dependence of the nuclear polarizability upon the field and its variations across the nucleus may be observable. The author is now planning some experiments of this type. Data on electric excitation[1] and the incidence of direct nuclear effects should be obtainable in the same experiments.

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Thermionic Emission from (Ba-Sr)O Cathodes Illuminated by the Incandescent Lamp

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ACCORDING to the aggregation theory of impurity centers in semiconductors,[1] the variation of the work function of BaO from 1.6 to 1.0 ev due to activation could be explained quantitatively to some extent, taking the trapping energy of an electron in an isolated impurity centers as 1.32 ev. From this theory, one expects the appearance of a lower work function than 1.0 ev by means of methods other than pure thermal activation (for example, an illumination by light of about 1.3 ev at high cathode temperature), or the existence of a trapping energy higher than 1.32 ev for an electron in an isolated impurity center. In order to establish which of the two is experimentally true, the following studies were carried out.