



JOURNAL

NOTES

Magnetic Poles

One of the most striking features of atomic physics is the fact that electricity always occurs in integral multiples of a quantum of electricity, the electronic charge. This feature has so far received no explanation. All the existing theories of electrodynamics, whether classical or quantum, allow of arbitrary values for the charges on particles. A possible way of escape from this deadlock is provided by the assumption that particles with single magnetic poles can exist. One can formulate consistent equations of motion for a particle with a pole of given strength in interaction with a charged particle according to the principles of quantum mechanics only provided the charge is an integral multiple of a certain charge, which is a function of the pole strength, Planck's constant, and the velocity of light. This charge we may take to be the electronic charge.

A particle with a single pole has never yet been observed. This is rather to be expected, since the pole strength which fits in with the observed value of the charge on the electron is very large, so that one would need an extremely large energy to separate this pole from its equal and opposite pole and so create a pair of particles, each with individual poles of opposite sign. With the large energies now becoming available for atomic experiments one may hope that single poles will reveal themselves in the future.

The present paper shows how the complete set of equations needed to describe particles with poles interacting with charged particles may be obtained from an action principle. The action integral is a multivalued function of its variables and one can get the required mathematical condition by putting the uncertainty in the action integral equal to an integral multiple of Planck's constant—a procedure which corresponds to the method of quantization of Bohr's theory.

P.A.M.D.

The Theory of Magnetic Poles. By P. A. M. Dirac. *Phys. Rev.* 74: 817, October 1, 1948.

Polarized Headlights

Possibly the greatest single hazard to night driving is the blinding glare a driver suffers when meeting another car. Eliminating this glare by using polarizing headlights and windshields was proposed as early as 1920. This proposal, and all later proposals, have involved either circular or linear polarizers at forty-five or ninety degrees to the vertical. In this paper the authors discuss both the early specific systems and the general polarized headlight system, in which any variety of elliptical polarizer

is placed at any orientation over the headlight and the corresponding analyzer is properly positioned on the windshield. It is shown that although all the systems extinguish the opposing headlights, they differ markedly in other characteristics such as relative transmission of daylight glare, transmission of light reflected from various objects, and contrast between objects and the road. This last characteristic has special significance for driving safety. People's clothes and road surfaces do not show the same contrasts in reflecting polarized light as they do in reflecting unpolarized light. It is because of these differences that the contrast between a person and the road in a polarized light headlight system depends on the type and orientation of the polarizer. Thus it is possible, in an unpolarized system, to have zero contrast whereas the same situation in a polarized system will have a contrast that is clearly discernible. A table is shown in which the characteristics of six different polarized headlight systems are compared. Polaroid Corporation, after consideration of these criteria, is now using for its performance demonstrations an inclination of the viewer polarizer minus thirty-five degrees from the vertical. B.H.R.

A Comparative Survey of Some Possible Systems of Polarized Headlights. By B. H. Billings and E. H. Land. *J. Opt. Soc. Am.* 38: 819, October 1948.

Geologic Age

Radioactive decay has been used to estimate the age of rocks, by measuring the percentage of uranium in the rocks that had decayed into helium and lead. A new radioactivity measure of geologic age may be at hand. Naturally radioactive potassium has long been known to decay, upon emitting an electron, to form calcium. The high abundance of a heavy stable isotope of argon of about the same atomic weight as potassium has been taken by some as evidence that potassium also decays into argon by capturing an electron, a view strengthened by the fact that x-rays are emitted by potassium. The first direct evidence to support this hypothesis is found in the present research in which an isotopic analysis of the argon from four old potassium minerals was made. In each case a very definite excess amount of argon was measured.

It was calculated that approximately six percent of the potassium atoms decay to form heavy argon. The correlation between the amount of argon detected and the age of the mineral is good enough in these preliminary experiments to indicate that when the time of decay and the ratio of decay products of radioactive potassium are known with more certainty the exact potassium and heavy argon content of a mineral will furnish a new measure of its geological age. A.O.C.N.

Argon 40 in Potassium Minerals. By L. T. Aldrich and Alfred O. Nier. *Phys. Rev.* 74: 876, October 15, 1948.

Rockets and Meteorites

Rockets may possibly be made fast enough to reach equilibrium with the earth's gravitational field and re-