



Magnetic Moment of the Electron

Recent work by Lamb and Retherford on the fine structure of hydrogen and by Nafe, Nelson, and Rabi on the hyperfine structure of hydrogen, has indicated that the detailed conclusions of the Dirac theory are not completely in accord with experimental results.

The experiments described in this paper yield a determination of the magnetic moment of the electron. The result was obtained from the observation of the radio-frequency spectra of various atoms by atomic beam methods. The experiment consists essentially in comparing the Zeeman splittings of atomic states in different modes of spin-orbit coupling. It is found that the magnetic moment of the electron is greater than the predicted value by about 0.12 percent. The increment may be called the 'intrinsic' magnetic moment of the electron, since either it must be inserted into the Dirac theory as a specific property of the electron or else it must result from a modified theory.

Recent theoretical considerations, notably by Schwinger, have indicated that a consideration of the interaction of the electron with the quantized radiation field does, indeed, yield a moment as observed experimentally. P.K.

Magnetic Moment of the Electron. By P. Kusch and H. M. Foley. *Phys. Rev.* 74: 250, August 1, 1948.

Graphite

The amount of heat that graphite absorbs in direct transformation from solid to vapor (its heat of sublimation) has been the source of considerable controversy for many years. Proposed values range from 6.6 to 17.5 thousand calories per gram. Spectroscopists have viewed the emission of light from excited carbon monoxide molecules and have selected several values of the heat of dissociation of carbon monoxide which give several values for the sublimation of graphite. Their problem is further complicated by the fact that graphite vaporizes into a gas containing both single atoms and diatomic molecules of carbon.

This paper reports experiments to determine the total pressure exerted by the graphite vapor, carbon atoms and carbon molecules, when it is in equilibrium with its solid state. It also describes the construction and operation of the high temperature graphite tube furnace which was used to produce a path of carbon vapor in equilibrium with solid graphite. The light emitted by the vapor was allowed to pass through a spectrograph and from the change of intensity of the molecular emission bands as the temperature of the furnace was changed, the heat of formation of molecular gas was determined. From this it was possible to calculate the heat consumed in dissociating the gases carbon monoxide and molecular carbon.

The spectroscopic methods developed in this work promise to be very useful for future use in determining the heats of formation and dissociation of molecules, some of which may be unstable at room temperature but which may exist in appreciable concentrations at high temperatures. Also, the methods may be useful in determining the vapor pressure and heat of sublimation of various heat-resisting metals and compounds. L.B.

The Vapor Pressure and Heat of Sublimation of Graphite. By Leo Brewer, Paul W. Gilles, and Francis A. Jenkins. *J. Chem. Phys.*, 16: 797, August 1948.

Distorted Binocular Vision

The two eyes observe objects in space from slightly different points of view and the slight differences in what the two eyes see localize the objects in space. But if the functional sizes of the images of objects differ in the two eyes, the sizes, shapes, and distances may appear distorted and space disoriented. The distortion is particularly marked when the image of one eye is magnified in a single meridian—for example, by placing a weak astigmatic lens or an afocal lens with cylindrical surfaces before one eye. Aniseikonia is the name given to the abnormal condition found in some individuals in which a difference in magnification of the images exists. It usually arises when unequal refractive errors of the two eyes are corrected with eyeglasses. Aniseikonic patients, however, rarely complain of a distorted space, for usually they depend upon guidance from nearby objects to give them space perception and tend to ignore the incorrect localization caused by aniseikonia.

Horizontal, vertical, and oblique magnification all produce characteristic types of distortion, some of which were described as early as 1876 but which have recently been investigated systematically by Ames. This paper shows that most of the distortions can be predicted on the basis of geometry. Equations are derived relating the normal and the distorted spaces and these depend on the nature of the magnification introduced and the distance between the pupils of the observer's eyes. It has been found that vertical magnification of the image of one eye produces the same kind of distortion as horizontal magnification of the image of the other eye, though in this case the distortion cannot be predicted by the geometry. As a result, overall (spherical) magnification of the image of one eye produces no noticeable distortion. The usefulness of this study has already been demonstrated in a clinical instrument called the Eikonometer, which measures a patient's aniseikonia by the spatial disorientations he observes. K.N.O.

Distortion of Stereoscopic Spatial Localization. By K. N. Ogle and P. Boeder. *J. Opt. Soc. Am.*, 38: 723, August 1948.