changes in the alpha-emission, as previously thought, but in the fact that the odd nucleon hinders the assembly of the components of the alpha-particle, consisting as it does of a pair of neutrons and a pair of protons. The correlation of alpha-decay energy in terms of mass number and atomic number shows that for each element the isotopes exhibit a regular increase in alpha-energy with decrease in mass number except in the region of 126 neutrons where there is a reversal due to the special stability, the "closed shell" character, of 126 nucleons. This reversal has the effect of creating a region of relatively low alpha-energy and long half-life at low mass numbers for such elements as astatine, emanation, and francium (atomic numbers 85–87) and possibly higher elements as had been noted already for bismuth and polonium. In this region of tightly bound nuclei with abnormally small nuclear radii the half-life for a given alpha-energy also is longer than usual, as expected on the basis of the quantum mechanical treatment.

The present state of the correlations makes it possible to predict with confidence the alpha-energy and half-life of the missing nuclei and even to predict the disintegration energies, and with less confidence the half-lives, of a number of the missing beta- and orbital electron capturing species in this region. Also, since the energy content of all of the nuclei above lead can be tied together by means of the data on the alpha-emitters, together with the information on the beta-particle emitters where the evaluation is at present more difficult because of lack of adequate data, it is now becoming possible to define the nuclear energy surface in this region.
G.T.S.

Systematics of Alpha-Radioactivity. By I. Perlman, A. Ghiorso, and G. T. Seaborg, *Phys. Rev. 77:26, January 1, 1950.*

Light Scattering

The recent revival of interest in light scattering, initiated by Debye and others, is principally due to its usefulness for studying large molecules, such as those of proteins or synthetic high polymers. The general theory is complicated, but Einstein showed in 1910 that, when the dimensions of all scattering particles and the effective range of the forces between them are small compared to the wavelength, the scattering can be treated as a fluctuation phenomenon. This development made possible the calculation of the thermodynamic properties of liquid solutions (e.g., molecular weights, free energies of mixing, etc.) from measurements of turbidity, which can be made rapidly and accurately with modern apparatus.

Most of the existing experimental data, and also the commonly familiar theory, are restricted to one or two-component systems, but solutions of three or more components offer possibilities of obtaining additional thermodynamic information on the interactions between dissimilar molecules. To allow the interpretation of measurements in such systems, Einstein's theory has here been extended to mixtures of arbitrary complexity by a straightforward application of fluctuation theory as developed by Gibbs in his treatment of grand canonical ensembles. Since completion of this work, it has been learned that Zernike long ago made the same developments (which were virtually inaccessible to American readers), and that Kirkwood and Goldberg currently have also repeated the work. The results are therefore not new, but simply cast existing theory into forms convenient for application.
W.H.S.

Light Scattering in Multi-Component Systems. By W. H. Stockmayer, *J. Chem. Phys. 18:58, January, 1950;* Light Scattering Arising from Composition Fluctuations in Multi-Component Systems. By J. G. Kirkwood and R. J. Goldberg, *J. Chem. Phys. 18:54, January, 1950;* F. Zernike, *Dissertation, Amsterdam, 1915.*

Nuclear Magnetism

The measurements of magnetic properties of nuclei have progressed so far that it is already possible to draw some conclusions as to the distribution of magnetism within an atomic nucleus. It is shown in the present paper that the measurements on the magnetic moment of the rubidium nucleus give slightly different results when measured with the two standard methods (the direct measurement of the magnetic moment in a molecular beam, or the indirect measurement of the magnetic moment by its influence upon the spectral lines of the atom). The essential step in the first method consists in measuring the energy which is necessary to turn the Rb nucleus around in a magnetic field supplied by a strong magnet. The second method uses the so-called hyperfine structure of spectral lines which reflects the effect of the magnetic field of the nucleus upon the electronic orbits in the atom.

It is shown that the influence of the magnetic moment upon the hyperfine structure depends to some degree on the distribution of magnetism within the nucleus, since the electron density varies considerably over the nuclear volume and hence also the interaction with the electron. Investigations have shown that the distribution of magnetism is considerably different within the two isotopes of Rb. It was attempted in the paper to connect this difference with the fact that the magnetic moment of the Rb isotopes is made up in different ways of orbital motion and intrinsic magnetism of the nucleus; a fact which was pointed out earlier by Schmidt and others.

It seems that the refinement of measurements of magnetic moments provides a new tool to investigate finer details of the nuclear structure. No longer is nuclear magnetism measurable only by its magnetic dipole moments, for we now have the possibility of determining the distribution of magnetism within the nucleus. V.F.W.

The Influence of Nuclear Structure on the Hyperfine Structure of Heavy Elements. By Aage Bohr and V. F. Weisskopf, *Phys. Rev. 77:94, January 1, 1950.*

Radar

Although radar waves have been used primarily for detection and communication purposes, they may also be used in a variety of other experiments, including investigations which overlap or extend optical experiments. In particular they may be used to study diffraction prob-