complemented by Shapiro who presents the dispersion theoretic approach. Elliott deals with the group theory of nuclear shells and shows how collective rotations arise from an individual particle model. De-Shalit's contribution, concerned with electric and magnetic moments in nuclei, is rather brief. The lectures of Belyaev and Soloviev constitute a thorough introduction to the pairing aspects of contemporary nuclear many-body theory. Tolhoek's 100-page paper on beta decay, muon decay, and muon capture is only weakly coupled to the other lectures—although there is some discussion of nuclear matrix elements—but his exposition, with an ample list of references, is a lucid and welcome review.

It is fortunate that this volume makes the proceedings of a profitable summer session available to a deservedly wide circle of readers.

Atlas of Optical Phenomena. By Michael Cagnet, Maurice Françon, Jean Claude Thrierr. 94 pp. (Springer-Verlag, Berlin) Prentice-Hall, Englewood Cliffs, N. J., 1962. $24.00. *Reviewed by Stanley S. Ballard, University of Florida.*

HERE is something that should warm the heart of every optics teacher and serve valiantly to better instruct his students. At last there is available, at a not unreasonable price, a series of illustrations of important phenomena in conventional geometrical and physical optics. To be sure, the usual textbooks do their best to show pictures of diffraction patterns, interference fringes, aberration effects, and the like, but these must necessarily be incidental to the development of the text itself. In *Atlas of Optical Phenomena* the roles are reversed: The pictures are the important things, and the text is secondary. The format is large—10 × 13½ inches—so that the photographs, two or three on each of the 45 pages of plates, can be reproduced on a pleasantly large scale. On the page facing each plate, there is a short description of the phenomenon, usually accompanied by an excellent line drawing with the various critical items lettered and referred to in the text. One surely would not start out to learn aberration theory and physical optics from this book, but having learned them or being in the process of studying them in a proper textbook, he would do well to turn to this Atlas for better illustrations and succinct accompanying explanations. The printing of the plates was done in Europe and is excellent; the distribution of the book in the USA and Canada is by Prentice-Hall.

A feature which strikes the eye immediately is that all captions and explanations are given successively in three languages: German, French, and English. This trilingual feature gives the volume a much wider audience, and it provides a quick and easy way for the American graduate student to check his German and French vocabularies, at least in the field of optics.

There are six subdivisions, not of equal length. The first, geometrical aberrations, includes some excellent pictures taken by the smoke technique of cones of light coming from lenses and the various aberrations in the light bundles. Clever arrangements have been used to show such well-known but often poorly illustrated phenomena as curvature of field and distortion. The second section, on interference, shows the effects that one would expect, plus some unusual ones such as a study of lens aberrations using the Twyman interferometric method. The third section is the longest; it treats diffraction at infinity—what we would call Fraunhofer diffraction. The following section, Fresnel diffraction, is called diffraction at a finite distance; the method of optical filtering to remove photographic plate grain or half-tone dots is illustrated. There is a short section on polarization which shows the usual in-

The interference effects caused by small deformations of the surface of a refracting medium are here illustrated by the patterns appearing around the feet of an insect settled on a water surface. (From *Atlas of Optical Phenomena*, p. 44)

terference patterns caused by convergent polarized light passing through crystals, and some excellent stress-birefringence and photoelasticity pictures. The last section, having to do with phase-contrast and interference-contrast microscopy, lives up to everything one would expect from Professor Françon, whose contributions in this field are so well known.

The English text is brief and to the point, and the usage will not offend the delicate American eye or ear. I happen to be allergic to the over-use of such superfluous phrases as "in the case of . . .", but Europeans are not the only offenders in this regard.

One has to see the *Atlas of Optical Phenomena* to believe it! The hope is here expressed that copies will be available in each Physics Department so that students in optics courses can profit by this valuable new contribution to improving the teaching of physics. Industrial scientists and research men will also be interested, especially in a particular phenomenon that may be illustrated to their satisfaction, but it is to the teacher and the student that this book will be most valuable.

The Distribution and Motion of Interstellar Matter in Galaxies. L. Woltjer, ed. Conf. Proc. (Institute for Advanced Study, Apr. 1961). 330 pp. Benjamin, New York, 1962. $11.75. *Reviewed by Vera C. Rubin, Georgetown College Observatory.*

IN April 1961, a conference on problems of the distribution and motion of interstellar matter in galaxies was held at the Institute for Advanced Study. About 30 astronomers and astrophysicists presented papers and discussed their work; this volume is a report of the proceedings. Three major topics of discussion emerge: the interpretation of the radio observations of neutral hydrogen in terms of a model of our own galaxy; characteristics of interstellar matter in other galaxies; and the dynamics of galactic gas.

The 21-cm radio observations and models of the galaxy presented by Oort, Blaauw, Helfer, and others, survey much of the important work in this field during the past five years. These papers are all of a casual nature, in many cases reporting on work which has since been published in greater technical detail. Yet they constitute a valuable addition to the astronomical literature by revealing the attitude of the author toward his work and toward his conclusions, a feature necessarily missing from the more impersonal technical work.

Two papers concerning gas in elliptical and SO galaxies (Osterbrock) and spiral and elliptical galaxies (E. M. Burbidge) contain a wealth of detailed observational material in compact form.

The progression of papers from small-scale to large-scale dynamics of the interstellar gas invoke a variety of physical processes: mass and energy balance, thermal instabilities, ionization, shock fronts, gravitational and magnetic fields, mass ejection from stars, and many more. Some of the papers follow directly from astronomical observations; many are of a theoretical nature. Over-all, however, they serve well to illustrate the range of physical questions being studied.

The editing is excellent. The often lengthy and always stimulating discussions following each paper give the reader an insight into future work in this field. There is only a minor annoyance in the continual juggling of l^{I}, l^{II}, b^{I}, and b^{II} coordinates; this is probably a necessary consequence in a science which introduces a new coordinate system at mid-century.

Galaxy M82 (NGC 3034). Letter symbols indicate regions examined spectroscopically for evidence of rotations, internal motions, and gas and dust. (From *Interstellar Matter in Galaxies*)