

interference 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.*

**I**N 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*)

