
Astronomy, being an observational science, relies heavily on models as aids to deriving quantitative measurements of physical and chemical properties; and there is no topic for which models play a more important rôle than the study of stellar atmospheres, where any measurement worthy of the name relies on an approximate characterization of the continuum- and line-forming regions. The approximations inherent in 'classical' models are, by the definition of the Editors of this volume, hydrostatic, radiative, and local thermodynamic equilibria (LTE), and plane-parallel stratification.

Beyond Classical Models, the proceedings of a NATO Advanced Research Workshop held in Trieste in September of 1990, records the recent considerable advances in relaxing those approximations. As measured by numbers of contributions, current interest largely revolves around new techniques for the accelerated convergence of approximate lambda operators — ALI, or accelerated lambda iteration. Several independent ALI codes now exist (most commented in German!), and the methods are so powerful that calculations are already being made which explicitly include dozens of non-LTE levels and hundreds of line transitions. Anderson’s “multi-frequency/multi-gray” method, though less widely implemented, offers an alternative attack on the fearsome non-LTE line-blanketing problem. Further remarkable developments covered in this volume include the calculation of time-dependent hydrodynamics of radiation-driven stellar winds, and 3-D simulations of dynamics and radiative transfer in inhomogeneous media. There are also interesting summaries of opacity calculations for astrophysical applications, by Hummer and Kurucz.

This book combines authoritative reviews with exciting results from the first applications of new techniques, thereby fulfilling the rôle of basic reference source as well as providing an up-to-date summary of continuing progress. The presentation is pleasingly uniform (every contribution is TeXed) and there is a well-organized index. Altogether, a timely and impressive volume.—IAN HOWARTH.


William Liller is a distinguished observational astronomer who was Robert Wheeler Willson Professor of Applied Astronomy at Harvard (where he succeeded Cecilia Payne-Gaposchkin as departmental Chairman) from 1960 to 1981. Then aged 55 he ‘retired’ to Chile, where he continues to be active as Assistant Director of the Instituto Isaac Newton headed by Gonzalo Alcaino. He has made significant contributions in many fields, including photoelectric spectrophotometry of planetary nebulae (which he pioneered with Lawrence Aller at the University of Michigan in the 1950s), polarimetry, comets and asteroids, solar eclipses, occultations of stars by planets, optical studies of quasars and X-ray sources, globular clusters, and archaeo-astronomy. Equally important has been his guidance and stimulation of students and colleagues, fifty of whom gathered in Cambridge Massachusetts in 1987 June to celebrate his sixtieth birthday and produce this Festschrift volume which reflects the broad sweep of his interests.