Asymptotic Giant Branch Stars

by Harm J. Habing & Hans Olofsson (Eds.)

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In the Hertzsprung–Russell diagram, there is a bifurcation at the upper right. The lower prong of the fork is the Red Giant Branch, where stars have evolved from the main sequence; the upper prong is known as the Asymptotic Giant Branch (AGB). AGB stars have red giants as progenitors, and are fated to become planetary nebulae and white dwarfs.

This book comprises a set of papers dealing with all aspects of the physics of these stars. An introductory overview is followed by the evolution of AGB stars, and study of their variability. A chapter follows on synthetic models of AGBs; by attempting to explain and predict facets of the observational data using computer models, rather than attempting to model all aspects by choosing specific areas, a greater insight can be gained. A chapter is dedicated to the atmospheres of AGBs, a somewhat indefinite region in the outer layers of the star, where stellar winds may be rooted. As evolutionary 'Late' stars, AGBs are carbon and other 'heavy' element rich, and are significant sources of dust. The creation of dust and its properties in the vicinity of the AGB consumes much discussion, leading to a chapter on the circumstellar envelope, where the gas and dust collects as it is driven away by the winds. The envelope in the future may be destined to become a planetary nebula.

Two 'side chapters' follow. The first considers the use of AGBs for investigating stellar populations, including observational analysis of the Magellanic clouds and M31, M32, NGC 205, M33 and other galaxies in the local group. The second is an interesting look at AGBs in binary systems, where the companion is most likely not an AGB, and where mass transfer becomes significant. The final chapter of the book deals with the post AGB stars in a light review, as this field is being actively researched, and as observational techniques improve information and theory become quickly outdated.

The stages from AGB to proto-planetary nebula to planetary nebula are not really considered in this book, and if these fields are of interest to you, you would probably be better advised to read a book such as Sun Kwok's *The Origin and Evolution of Planetary Nebulae*.

This cannot really be said to be an easy book. It is intended for a graduate study level, and a background in physics, chemistry and astrophysics would be needed to get the most out of it. However, the chapters which are designed to be self-standing do provide interesting discussions about theory and corroborative observations, and I think there is lot that can be gleaned without working through the mathematics.

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Callum Potter is a Physics graduate from St Andrews University, and has had a long interest in astrophysics and stellar evolution. By day he works as a software development manager, and by night particularly enjoys deep sky observing.