Preface

This volume, a record of the proceedings of Colloquium 187 of the International Astronomical Union, comprises a set of reviews and associated, and dissociated, articles on various stars that might be called exotic or bizarre. The list is not exhaustive, nor could we hope it to be, but is representative of the interests of those keen to share their bizarre stars with others, in some cases because they have an explanation of the behaviour, in others because such an explanation remains elusive. A few contributions describe general physical processes and others examine the prospects of upcoming astronomical surveys that will no doubt change our conception of what is exotic.

IAU Colloquium 187 – Exotic Stars as Challenges to Evolution – was held from the 4th to 8th March 2002 at the Kovens Conference Center on the Biscayne Bay campus of Florida International University in Miami, Florida. The conference was sponsored by the International Astronomical Union, the Max-Planck-Institut für Astronomie (Heidelberg), and Florida International University's Division of Sponsored Research, College of Arts & Sciences and Department of Physics. We are very grateful for this support without which the conference may not have taken place.

Given the wide variety of objects that deserve to be called exotic, a conference on exotic stars could easily lead to a grab bag of disjoint contributions. However the common thread of evolution, and the challenge that exotic stars pose to understanding stellar evolution, created a unique opportunity for important astrophysical results in a variety of fields. The stars selected for review clearly reflect that common theme. Compact objects and accretion discs, as in SS 433 (S. K. Chakrabarti), are often at the heart of exotic behavior. Study of such discs on a stellar scale can have an impact on understanding similar structures on the grander scale of, for example, Active Galactic Nuclei. An exotic nature may derive from physical interactions in multiple systems so we might slightly modify Alexandre Dumas' advice and *cherchons le double*, as in R. Humphreys' review of η Carinae, *cherchons le triple* as in P. Eggleton's review, or *cherchons les champs magnétiques* (D. Lai). The ability of some exotic stars to maintain an elusive nature is extraordinary, with major issues open after two hundred years of extensive observations and an very long list of publications in the case of β Lyrae (A. P. Linnell). Then there are the 180 years of mystery and 2000 years of data in E. F. Guinan's review of ϵ Aurigae. Unusual chemical composition is another common cause of the exotic, as illustrated by Przybylski's star (D. Kurtz), CW Leonis (G. R. Knapp), FG Sagittae (D. Schönberner) and V652 Herculis (C. S. Jeffery). With Earth and space-based observational facilities that have come on line over recent decades, many new and important discoveries warrant discussion of exotic stars within a conference framework. Further comments on the original idea for the conference, its general theme and scientific goals can be found in the Foreword.

The meeting consisted of nine half-day sessions. Each began with an invited review which was followed by shorter oral contributions. Posters were on display for the entire week, with ample time for viewing around morning and afternoon coffee breaks. We thank Peter Eggleton for his whimsically insightful opening remarks that set the stage for a lively conference and Simon Jeffery for his very clever summary of the many highlights. Transcripts of discussions or questions and answers that followed the presentations were sent to the speakers for incorporation in their manuscripts at their pleasure. All the reviews are reported here and only a few other contributors were unable to deliver a manuscript in time for publication so this volume represents a near complete record.

We are pleased to acknowledge all who have contributed to the success of the Colloquium. First and foremost, we thank Bob Wilson, chairman of the Scientific Organizing Committee, for his tireless[1] efforts to make the conference happen. The idea grew out of a dinner discussion in Cambridge between Andi Burkert and Bob and soon thereafter Bob started exploring the feasibility of turning the idea into a real event. He led efforts to have the conference sponsored by the IAU and managed to line up an impressive list of review speakers. Ed Guinan provided invaluable support and advice throughout the organizing process. These together with ourselves and Peter Eggleton (UK, now USA), Zhanwen Han (Peoples Republic of China), Pavel Kroupa (Germany), Norbert Langer (Netherlands) and Patricia Whitelock (South Africa) formed the Scientific Organizing Committee. We are grateful for everyone's assistance with the scientific program.

The Local Organizing Committee consisted of the Florida International University astronomers Rolando Branly, Caroline Simpson, James Webb and Walter Van Hamme who acted as chairman. We thank them for the time they gave to the logistical aspects of the conference and their patience in dealing with the occasional unexpected twists and turns in the machinery of conference organizing. We also thank FIU's Astronomy Laboratory Manager Andrea Folcik and graduate students Emily Howard, Mansie Iyer and Humberto Velasquez for their help.

An evening visit to FIU's Wolfsonian Museum on Miami Beach, with a reception, was made possible by a generous donation from the Southern Cross Astronomical Society, South Florida's thriving amateur astronomy club. The conference banquet was crowned by Don Kurtz's captivating dinner causerie on the Lancashire legacy of Jeremiah Horrocks being a story of sea battles, ship wrecks, tropical maidens, Captain Cook, Mason and Dixon, Louis XIV, Christopher Wren, Edmund Halley, poor le Gentil and the observing run from hell, Transits of Venus and the measurement of the astronomical unit – the beginning of our understanding of the size of the universe. We thank Don on behalf of all who attended the banquet. And not least, we thank all participants for making this Exotic Stars conference memorable and scientifically enriching.

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August, 2002

[1]Well, he did get tired after a while.