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RR Lyrae Stars, Metal-Poor Stars, and the Galaxy

Edited by

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Contents

Introduction	vi
Conference Photograph	vii

PART I: RR LYRAE STARS

RR Lyrae the Stellar Beacons of Galactic Structure	1
Giuseppe Bono, Massimo Dall’Ora, Filippina Caputo, Giuseppina Genovali, Marcella Marconi, Anna Marina Piersimoni & Robert Stellingwerf	
RR Lyrae Period-Amplitude Diagrams: From Baily to Today	17
Horace A. Smith, Márcio Catelan & Charles Kuehn	
Atmospheres of RR Lyrae Stars	29
Merieme Chadid	
Period Determination of RR Lyrae Stars	47
Robert F. Stellingwerf	
Rotational Modulation in RRs/δ Scuti Star Pulsation	66
Michel Breger	
RR Lyrae Research with the Kepler Mission	74
Karen Kinemuchi	
Non-Blazhko RR Lyrae Stars Observed with the KEPLER Space Telescope	84
James M. Nemec, Radoslaw Smolec, József M. Benkő, <i>et al.</i>	

Peculiarities of Blazhko Stars: New Insights Katrien Kolenberg	100
The Galactic Oosterhoff Dichotomy in Terms of Period-Color Relations at Maximum/Minimum Light Shashi Kanbur, Ata Sarajedini, Karen Kinemuchi, Roger Cohen & Chow-Choong Ngeow	112
RR Lyrae Variables in NGC 2808 Andrea Kunder, Peter B. Stetson, Márcio Catelan, Pía Amigo, & Roberto De Propris	117
New Variable Stars in CMa Globular Cluster Candidates Pía Amigo, Márcio Catelan, Peter B. Stetson, Horace A. Smith, Carla Cacciari, & Maneula Zoccali	127
Mapping the Galactic Halo with SDSS, LINEAR and PTF RR Lyrae Stars Branimir Sesar	135
The Vista Variables in the Vía Láctea (VVV) ESO Public Survey: Current Status and First Results Márcio Catelan, Dante Minniti, Philip W. Lucas <i>et al.</i>	145
RR Lyraes and Type II Cepheids in the Magellanic Clouds: Distance Scales and Population Gradients Michael Feast	170
RR Lyrae Variables in M31 and M33 Ata Sarajedini	181

PART II: Metal-Poor Stars and The Galaxy

New Initiatives on RR Lyrae Chemical Compositions Christopher Sneden, Bi-Qing For, & George W. Preston	196
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Metal Abundance Calibration of the Ca II Triplet Lines in RR Lyrae Stars	210
George Wallerstein, Thomas Gomez & Wenjin Huang	
Element Diffusion and Accretion in Metal Poor Stars	216
Sylvie Vauclair	
<i>r</i>-Process Abundance Signatures in Metal-Poor Halo Stars	223
John J. Cowan, Ian U. Roederer, Christopher Sneden & James E. Lawler	
A Status Report on the OZ Project	239
Judith G. Cohen, Norbert Christlieb, Andrew McWilliam, Stephen Shectman & Ian Thompson	
Determining Photometric Metallicities of dSph Stellar Populations	249
Joanne Hughes & George Wallerstein	
The Chemical Evolution of Milky Way Satellite Galaxies	263
Evan Kirby	
The Bulge Radial Velocity/Abundance Assay	264
R. Michael Rich	

Introduction

In 1959 George Worrall Preston, III, completed his PhD thesis on “A Spectroscopic Study of the RR Lyrae Stars”, where he introduced the Delta-S method to the world and showed that RR Lyrae do not all have the same metal content. At that time the idea that some stars were metal-poor was a relatively new concept (Chamberlain and Aller 1951), which drew skepticism from a number of prominent stellar spectroscopists. George’s work on the RR Lyrae stars made it very difficult to explain the spectral line differences with atmosphere effects alone; metal content must also play a role. Thus, George’s RR Lyrae work enabled the study of distance and composition, crucial for understanding the Galaxy, and was an important step toward current ideas in chemical evolution.

In the 1980s George Preston and Stephen Shectman began a project to find the most metal-poor stars in the Galaxy. After inspecting more than a million stars on Schmidt objective prism plates, following them up with low resolution, and finally, high resolution spectroscopy, George and Shec found a sample of extremely metal-poor stars, down to 1/10,000 of the solar metallicity. This sample of stars provides a fossil record of the earliest phase of chemical enrichment in the Galaxy. The work has had profound impacts on nucleosynthesis and chemical evolution and has revived the field of high resolution stellar abundance analysis.

Recently, George has returned to the field of RR Lyrae research. In particular, he has used the echelle spectrograph, on the duPont 100-inch telescope at Las Campanas Observatory, in a novel project to follow the changes in the high resolution spectral features of a number of RR Lyrae stars with a cadence of a few minutes. This is a new way of looking at RR Lyrae stars, and will clearly play an important role in future understanding.

George’s impact on astronomy goes beyond his scientific papers. Those that know him are aware of his ebullient personality. He is great to work with and he makes work fun. His advice on astronomy is just that: to have fun.

On the occasion of his 80th birthday, and given his scientific contributions over the years, it was appropriate that we celebrate George; that was the main motivation for a conference, in January 2011, on “*RR Lyrae Stars, Metal-Poor Stars and the Galaxy*”. However, recent advances in RR Lyrae research, from satellite data, provided a compelling scientific reason to review this field with a conference, and work on metal-poor stars continues to be at the forefront of astronomical and nuclear physics research. This book is the result of that conference. The entire proceedings may be down-loaded for free at “<http://www.gwp80.obs.carnegiescience.edu/proceedings/coasv5.pdf>”.

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