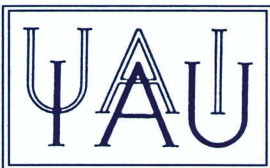


INTERNATIONAL ASTRONOMICAL UNION

SYMPOSIUM NO. 192

# THE STELLAR CONTENT OF LOCAL GROUP GALAXIES

Edited by: PATRICIA WHITELOCK and RUSSELL CANNON



INTERNATIONAL ASTRONOMICAL UNION

PUBLISHER  
ASTRONOMICAL SOCIETY OF THE PACIFIC

THE STELLAR CONTENT OF LOCAL GROUP GALAXIES  
IAU SYMPOSIUM NO. 192

A list of IAU Volumes for 1998  
and information for ordering both previous volumes and forthcoming for 1998  
may be found at the back of this volume.

---

---

**THE STELLAR CONTENT OF LOCAL GROUP GALAXIES**

---

---

All Rights Reserved

Copyright © 1999

**INTERNATIONAL ASTRONOMICAL UNION**

**98bis, bd Arago – 75014 Paris – France**

Tel: +33 1 4325 8358; Fax: +33 1 4325 2616; E-mail: iau@iap.fr

*No part of the material protected by this copyright notice may be reproduced or utilized in any form or by any means, electronic or mechanical including photocopying, recording or by any information storage and retrieval system, without written permission from the IAU.*

Published on behalf of the  
**INTERNATIONAL ASTRONOMICAL UNION**



by

Astronomical Society of the Pacific

First published 1999

Managing Editor, D. Harold McNamara

Production Manager, Enid Livingston

**EDITORIAL/PUBLISHING OFFICE:**

Managing Editor

PO Box 24463

211 KMB Brigham Young University

Provo, UT 84602-4463

USA

(801) 378-2298

Phone

(801) 378-2265

FAX

pasp@astro.byu.edu

E-Mail

**CATALOG/BOOK ORDERS:**

IAU Publications

390 Ashton Avenue

San Francisco, CA 94112-1722

USA

(415) 337-1100

Phone

(415) 337-5205

FAX

catalog@aspsky.org

E-Mail

www.aspsky.org

Web Site

Printed by BookCrafters, Inc.

Chelsea, Michigan

Library of Congress Catalog Card Number: 99-60478

ISBN: 1-886733-82-1

**INTERNATIONAL ASTRONOMICAL UNION  
UNION ASTRONOMIQUE INTERNATIONALE**



**THE STELLAR CONTENT OF  
LOCAL GROUP GALAXIES**

Proceedings of the 192nd Symposium  
of the International Astronomical Union  
held in Cape Town, South Africa  
7-11 September 1998

Edited by:

**PATRICIA WHITELOCK and RUSSELL CANNON**

Publisher



# Table of Contents

Preface . . . . . xi

Conference participants . . . . . xiii

Conference photograph . . . . . xvi

## Part 1. Setting the Scene

### Introductory Reviews

Stellar Content of Local Group Galaxies - An Introduction . . . . . 3  
*S. van den Bergh*

Evolutionary Histories of Dwarf Galaxies in the Local Group . . . . . 17  
*E. K. Grebel*

Local Group Dynamics . . . . . 39  
*D. Lynden-Bell*

Distance Scales and the Local Group . . . . . 51  
*M. Feast*

## Part 2. The Database

### The Galaxy and its Companions: Contributed Papers

Near-Infrared Catalogue of the Magellanic Clouds: DENIS (Deep Near-IR Southern Sky Survey) . . . . . 65  
*M. R. Cioni, H. J. Habing, C. Loup, M. A. T. Groenewegen, N. Epchtein and the DENIS Consortium*

Reconstructing the Star Formation History of the Magellanic Clouds . . 72  
*J. Harris, D. Zaritsky, E. K. Grebel and I. Thompson*

### Poster Papers

Interesting Variables near the Quintuplet Cluster . . . . . 81  
*I. S. Glass, S. Matsumoto, B. S. Carter and K. Sekiguchi*

Stellar Clusters in the Outermost Milky Way Galaxy . . . . . 85  
*J. E. Hesser, P. B. Stetson, S. van den Bergh, M. Bolte, J. A. Johnson, W. E. Harris, D. A. Vandenberg, R. A. Bell, H. E. Bond, L. E. Fullton, G. G. Fahlman and H. B. Richer*

The Distance and Orientation of the Galactic Bulge from Mira Variables: A Preliminary Report . . . . .	89
<i>R. M. Catchpole, P. A. Whitelock, M. W. Feast, S. M. G. Hughes, C. Alard and E. Olivier</i>	
ISO Observations of AGB Stars in the Small Magellanic Cloud . . . . .	95
<i>J. A. D. L. Blommaert, M. A. T. Groenewegen, M. R. Cioni, H. J. Habing, J. T. van Loon and N. R. Trams</i>	
A Survey of X-ray Point Sources in the Magellanic Clouds . . . . .	100
<i>A. P. Cowley, P. C. Schmidtke, V. A. Taylor, T. K. McGrath, J. B. Hutchings and D. Crampton</i>	
Radio and X-ray Study of SNRs in the Magellanic Clouds . . . . .	104
<i>M. D. Filipović, W. Pietsch, G. L. White, F. Haberl, L. Staveley-Smith, P. A. Jones, R. F. Haynes and M. Sasaki</i>	
Old Structure – Young Stars The Stellar Content of the Centre of the LMC Bar . . . . .	108
<i>P. Linde, A. Ardeberg and B. Gustafsson</i>	
Optical Counterparts to Be/X-ray Binaries in the Magellanic Clouds . .	112
<i>D. A. H. Buckley, J. B. Stevens and M. J. Coe</i>	
The Relative Source-Lens Proper Motion in MACHO 98-SMC-1 from Ob- servations by the PLANET Collaboration . . . . .	116
<i>J. Menzies and the PLANET Collaboration</i>	

**Dwarf Spheroidals: Contributed Papers**

The Sagittarius Dwarf Galaxy Survey (SDGS): Constraints on the Star Formation History of the Sgr dSph . . . . .	121
<i>M. Bellazzini, F. R. Ferraro and R. Buonanno</i>	
Spectroscopy of Red Giants of the Sagittarius Dwarf Galaxy . . . . .	129
<i>G. Marconi, P. Bonifacio, L. Pasquini and P. Molaro</i>	
Carbon Stars in the Sagittarius Dwarf Galaxy . . . . .	136
<i>P. Whitelock, J. Menzies, M. Irwin and M. Feast</i>	
The Carbon Star Population in the Fornax Dwarf Spheroidal Galaxy Re- visited . . . . .	144
<i>M. Azzopardi, G. Muratorio, J. Breysacher and B. E. Westerlund</i>	
The Star Formation History of Leo I . . . . .	151
<i>C. Gallart and W. L. Freedman</i>	

**Poster Papers**

A Search for RR Lyrae Variables and Anomalous Cepheids in the Fornax Dwarf Galaxy . . . . .	161
<i>D. Bersier and P. R. Wood</i>	

Ground-based and WFPC2 Imaging of Fornax: Spatial Variations in Star Formation History . . . . .	165
<i>E. K. Grebel and P. B. Stetson</i>	
New Photometric Surveys of the Fornax Dwarf Spheroidal Galaxy . . .	170
<i>T. A. Smecker-Hane, P. B. Stetson and J. E. Hesser</i>	
Star Formation History in the Fornax Dwarf Galaxy from HST data . .	174
<i>G. Marconi, R. Buonanno, M. Castellani, C. E. Corsi and R. Zinn</i>	
Wide Field Observations of the Ursa Minor dSph Galaxy . . . . .	179
<i>D. Martínez-Delgado and A. Aparicio</i>	

**M31 and Beyond: Invited Reviews and Contributed Papers**

CFHT Wide-Field Deep Imaging of M33 . . . . .	185
<i>J. -C. Cuillandre, J. Lequeux and L. Loinard</i>	
Color-Luminosity Relations for the Resolved Hot Stellar Populations in the Centers of M31 and M32 . . . . .	195
<i>T. M. Brown, H. C. Ferguson, S. A. Stanford and J. Deharveng</i>	
The Andromeda Dwarf Spheroidal Galaxies . . . . .	203
<i>T. E. Armandroff and G. S. Da Costa</i>	
Detailed Star-Formation Histories of Nearby Dwarf Irregular Galaxies using HST . . . . .	218
<i>E. Tolstoy</i>	
HST Color-Magnitude Diagrams of Globular Clusters in NGC 185 and NGC 205 . . . . .	231
<i>D. Geisler, T. Armandroff, G. Da Costa, M. G. Lee and A. Sarajedini</i>	
Stellar Population of the Decoupled Nucleus in M31 . . . . .	237
<i>O. K. Sil'chenko, A. N. Burenkov and V. V. Vlasyuk</i>	
Deep Stellar Photometry of IC 10 . . . . .	244
<i>N. A. Tikhonov</i>	

**Poster Papers**

Nearby Blue Compact Dwarf Galaxy NGC 6789 . . . . .	253
<i>I. Drozdovsky and N. Tikhonov</i>	
The Young Stars in IC 1613 . . . . .	259
<i>J. Borissova, L. Georgiev, M. Rosado, G. Koenigsberger, R. Kurtev and G. Ivanov</i>	
Young Stellar Populations in M31, M33, and NGC 6822 . . . . .	263
<i>J. B. Hutchings, B. Cavanagh, L. Bianchi, R. Chandar and S. Scuderi</i>	
Stellar Populations and Local Group Membership of the Dwarf Galaxy DDO 210 . . . . .	268
<i>M. G. Lee</i>	

Differential Abundances of B-type Supergiants in M33 . . . . .	272
<i>M. I. Monteverde and A. Herrero</i>	
Analyses of Wolf-Rayet Stars in Local Group Galaxies . . . . .	277
<i>W. Schmutz, O. De Marco, H. Schild, P. Crowther and I. Howarth</i>	
Spectroscopy of Blue Stars with H $\alpha$ Emission in M33 . . . . .	280
<i>O. Sholukhova</i>	
The New Local Group Galaxy Candidates Cas dSph, Peg dSph = And VI, and Cam A . . . . .	284
<i>C. Gallart, D. Martínez-Delgado, A. Aparicio and W. L. Freedman</i>	

### Part 3. Star Formation Processes and Chemical Evolution

#### Invited Reviews

Massive Star Formation and Evolution in Local Group Galaxies: Successes and Difficulties. . . . .	291
<i>A. Maeder</i>	
The Star Formation History in Nearby Dwarf Galaxies: the Fossil Record in the Color-Magnitude Diagram . . . . .	304
<i>A. Aparicio</i>	

#### Poster Papers

Investigation of Dust Extinction in Sb Galaxies using Scale Length Ratios	321
<i>B. Cunow</i>	
Stellar Population Gradients in Phoenix and Leo I . . . . .	325
<i>D. Martínez-Delgado, C. Gallart, A. Aparicio and W. Freedman</i>	
Submillimetre Continuum Imaging of Large-scale Outflows in Nearby Star- burst Galaxies . . . . .	330
<i>L. L. Leeuw, E. I. Robson and D. H. Hughes</i>	
ROSAT HRI and PSPC Observations of M32 . . . . .	334
<i>Z. Zang and E. J. A. Meurs</i>	

#### More Invited Reviews and Contributed Papers

Structure and Evolution of Stellar Populations in Local Group Galaxies	341
<i>J. Einasto and P. Tenjes</i>	
Miras and Mass Loss in the Local Group . . . . .	348
<i>A. A. Zijlstra and T. R. Bedding</i>	
Synthesis of Lick Spectral Indices With Overshooting and No-Overshooting Model Atmospheres . . . . .	356
<i>R. K. Gulati and M. Chavez</i>	



**More Poster Papers**

New Grids of Synthetic Spectra for Abundance Derivation and Population Synthesis . . . . . 365  
*B. Barbuy, M. -N. Perrin, R. Cayrel, D. Katz, C. van't Veer and R. P. Schiavon*

The Application of Artificial Neural Networks: A Catalog of Spectral Indices . . . . . 369  
*R. K. Gulati, A. Bravo, G. Padilla and L. Altamirano R.*

The Stellar Content in the Central Region of M81 . . . . . 373  
*M. Joly, C. Boisson and D. Pelat*

Metallicity-dependent Spectral Evolution . . . . . 377  
*P. Traat*

**Part 4. Morphology, Kinematics and Dynamics**

**Invited Reviews and Contributed Papers**

Internal Dynamics of Local Group Galaxies . . . . . 383  
*K. C. Freeman*

Hot Horizontal-Branch Stars in the Galactic Bulge . . . . . 395  
*D. M. Terndrup, R. C. Peterson, E. M. Sadler and A. R. Walker*

Implication of Dark Matter Content in Dwarf Spheroidal Galaxies . . . 402  
*H. Hirashita, T. T. Takeuchi and H. Kamaya*

Proper Motions of Local Group Satellites . . . . . 409  
*M. Irwin*

Age and Mass of the Local Group from Satellite Galaxy Dynamics . . . 420  
*A. B. Whiting*

The Dynamics of the Substructures and the Bulk Flow of the Local Group 427  
*V. G. Gurzadyan and S. Rauzy*

A New Look at Poor Groups of Galaxies . . . . . 433  
*A. I. Zabludoff*

**Poster Papers**

The Search for Galaxy Orientation in the Local Group . . . . . 443  
*P. Flin*

Orbits versus Star Formation Histories: A Progress Report . . . . . 447  
*E. K. Grebel, T. Kolatt and W. Brandner*

Two Species of Local Group Dwarf Spheroidals . . . . . 451  
*T. T. Takeuchi and H. Hirashita*

Visual and Near-Infrared Photometry of Nearby Dwarf Spheroidals . . .	455
<i>F. Kerschbaum, W. Nowotny, J. Hron and M. Schultheis</i>	
Correcting the PL Relation? . . . . .	459
<i>C. D. Laney</i>	
Comparative Morphology of the HST Color-Magnitude Diagram of the Nearby Blue Compact Dwarf Galaxy VII Zw 403 with that of Local Group Dwarfs . . . . .	464
<i>R. E. Schulte-Ladbeck, U. Hopp and M. M. Crone</i>	

## Part 5. Wider Implications and Future Prospects

### Contributed Papers

Application of SALT to the Local Group . . . . .	471
<i>R. S. Stobie</i>	
Applications of Multi-object Spectroscopy – A large Sample of Carbon Stars in the LMC . . . . .	480
<i>R. Cannon, A. Offer, D. Hatzidimitriou, B. Croke and D. Morgan</i>	
Thermal Infrared Survey of LMC, SMC and Sagittarius Dwarf Galaxy .	489
<i>H. U. Käuff, E. Tolstoy, G. Wiedemann, C. Loup, H. G. Reimann, L. B. F. M. Waters and A. Zijlstra</i>	
Compact Binaries as Tracers of Star Formation Histories: the XMM Sur- vey of M31 . . . . .	496
<i>U. Kolb, J. Osborne and M. G. Watson</i>	
Prospects for Studying the Local Group with the Subaru Telescope . . .	503
<i>K. Sekiguchi</i>	
General Discussion . . . . .	508
<i>R. Cannon and P. Whitelock (editors)</i>	
Personal Impressions From IAU Symposium 192: The Stellar Content of the Local Group . . . . .	517
<i>J. E. Hesser</i>	
Author index . . . . .	523
Subject index . . . . .	525