

CHEMICAL ABUNDANCES IN THE UNIVERSE:
CONNECTING FIRST STARS TO PLANETS

IAU SYMPOSIUM No. 265

COVER ILLUSTRATION: CHEMICAL EVOLUTION OF THE UNIVERSE

The illustration was prepared by the editors, combining the evolution of the Universe from the Big Bang, going through the first stars, first galaxies until the present day. The periodic table of the elements is the result of nucleosynthesis in the Big Bang for the light elements hydrogen, deuterium, tritium, helium, and traces of lithium, beryllium and boron, and all the heavy elements from carbon to uranium produced through nucleosynthesis in interiors of stars. The Earth contains heavy elements, which appear to be essential to form small solid planets. The artistic view was prepared by Pete Marenfeld (NOAO).

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**CHEMICAL ABUNDANCES IN
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TO PLANETS**

**PROCEEDINGS OF THE 265th SYMPOSIUM OF THE
INTERNATIONAL ASTRONOMICAL UNION
HELD IN RIO DE JANEIRO, BRAZIL
AUGUST 10–14, 2009**

Edited by

KATIA CUNHA

NOAO, USA & ON/MCT, BRAZIL

MONIQUE SPITE

OBSERVATOIRE DE PARIS-MEUDON, FRANCE

and

BEATRIZ BARBUY

UNIVERSIDADE DE SÃO PAULO, SÃO PAULO, BRAZIL



**CAMBRIDGE
UNIVERSITY PRESS**

CAMBRIDGE UNIVERSITY PRESS

The Edinburgh Building, Cambridge CB2 8RU, United Kingdom
32 Avenue of the Americas, New York, NY 10013-2473, USA
477 Williamstown Road, Port Melbourne, VIC 3207, Australia
Ruiz de Alarcón 13, 28014 Madrid, Spain
Dock house, The Waterfront, Cape Town 8001, South Africa

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First published 2010

Printed in the United Kingdom at the University Press, Cambridge

Typeset in System L^AT_EX 2 ϵ

A catalogue record for this book is available from the British Library

Library of Congress Cataloguing in Publication data

This book has been printed on FSC-certified paper and cover board. FSC is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world's forests. Please see www.fsc.org for information.

ISBN 9780521764957 hardback
ISSN 1743-9213

Table of Contents

Preface	xv
Organizing committee	xvii
Conference participants	xix

Plenary Session

Chair: Beatriz Barbuy

Nucleosynthesis now and then.	3
<i>Stanford E. Woosley, A. Heger, L. Roberts, and R. D. Hoffman</i>	

Session I. Primordial Nucleosynthesis and the First Stars in the Universe

Chairs: Monique Spite, Stan Woosley

Primordial nucleosynthesis after WMAP	15
<i>Gary Steigman (Invited Review)</i>	
⁶ Li in metal-poor halo stars: real or spurious?	23
<i>M. Steffen, R. Cayrel, P. Bonifacio, H.-G. Ludwig, and E. Caffau</i>	
The very first stars, formation and reionization of the universe.	27
<i>Volker Bromm (Invited Review)</i>	
Nucleosynthesis of the elements in faint-supernovae and hypernovae	34
<i>Ken'ichi Nomoto, Takashi Moriya, and Nozomu Tominaga (Invited Review)</i>	
The nucleosynthetic imprint of 15 - 40 M _⊙ : primordial supernovae on metal-poor stars.	42
<i>Daniel J. Whalen and Candace C. Joggerst</i>	
Constraints on the nature of the s- and r-processes	46
<i>Christopher Sneden, John J. Cowan, and Roberto Gallino (Invited Review)</i>	
Insights into the s-process and r-process as revealed by globular clusters.	54
<i>D. Yong, A. I. Karakas, D. L. Lambert, A. Chieffi, and M. Limongi</i>	
The slow-neutron capture process in low-metallicity asymptotic giant branch stars	57
<i>Amanda I. Karakas, Maria Lugaro, and Simon W. Campbell</i>	

Poster Papers

Enrichment of thorium (Th) and lead (Pb) in the early galaxy.	61
<i>Wako Aoki and Satoshi Honda</i>	
The impact of metallicity on the formation of pre-collapsing minihalos	63
<i>Aycin Aykotalp and Marco Spaans</i>	
The importance of initial conditions and metallicity for the fragmentation of protogalactic gas	65
<i>Anne-Katharina Jappsen, Simon C. O. Glover, Mordecai-Mark Mac Low, and Ralf S. Klessen</i>	

Silver stars	67
<i>Camilla Juul Hansen and Francesca Primas</i>	
Mass and angular momentum loss of first stars via decretion disks.	69
<i>Jiří Krtička; Stanley P. Owocki, and Georges Meynet</i>	
Precise Li abundances in metal-poor stars: depletion in the Spite plateau	71
<i>J. Meléndez, L. Casagrande, I. Ramírez, and M. Asplund</i>	
Gamma-ray bursts in the early Universe	73
<i>Attila Mészáros, Jakub Řípa, and David Huja</i>	
The metal-poor end of the Spite plateau.	75
<i>L. Sbordone, P. Bonifacio, E. Caffau, H.-G. Ludwig, N. Behara, J. I. Gonzalez-Hernandez, M. Steffen, R. Cayrel, B. Freytag, C. Van't Veer, P. Molaro, B. Plez, T. Sivarani, M. Spite, F. Spite, T. C. Beers, N. Christlieb, P. François, and V. Hill</i>	
A search for <i>s</i> -process elements in extremely metal-poor halo planetary nebulae	77
<i>Masaaki Otsuka, Akito Tajitsu, Hideyuki Izumiura, and Siek Hyung</i>	
Session II. First Stars in the Galaxy	
<i>Chairs: Judith Cohen, Johannes Andersen, Verne V. Smith</i>	
The first galactic stars and chemical enrichment in the halo	81
<i>P. Bonifacio (Invited Review)</i>	
An overall picture of EMP stars using the stellar abundances for galactic archaeology (SAGA) database	90
<i>Takuma Suda, Shimako Yamada, Yutaka Katsuta, Chikako Ishizuka, Yutaka Komiya, Takanori Nishimura, Wako Aoki, and Masayuki Y. Fujimoto</i>	
The most oxygen-poor planetary nebula: AGB nucleosynthesis at low metallicities.	94
<i>G. Stasińska, C. Morisset, G. Tovmassian, T. Rauch, and T. Decressin</i>	
Nucleosynthesis in rotating massive stars and abundances in the early galaxy	98
<i>Georges Meynet, Raphael Hirschi, Sylvia Ekstrom, André Maeder, Cyril Georgy, Patrick Eggenberger, and Cristina Chiappini (Invited Review)</i>	
Turbulent mixing stars: theoretical hurdles	106
<i>W. David Arnett and Casey Meakin (Invited Talk)</i>	
Carbon enhanced metal poor (CEMP) stars	111
<i>Wako Aoki (Invited Review)</i>	
Carbon-enhanced metal-poor stars as probes of early galactic nucleosynthesis	117
<i>Onno R. Pols, R. G. Izzard, E. Glebbeek, and R. J. Stancliffe</i>	
Poster Papers	
<i>s/r</i> ratios in carbon-enhanced metal-poor stars	118
<i>Dinah M. Allen, Sean G. Ryan, Silvia Rossi, and Stelios A. Tsangarides</i>	

HST-STIS abundances in the uranium-rich very metal-poor star CS 31082-001	120
<i>B. Barbuy, M. Spite, V. Hill, F. Primas, B. Plez, R. Cayrel, C. Sneden, F. Spite, T. C. Beers, J. Andersen, B. Nordström, P. Bonifacio, P. François, P. Molaro, and C. Siqueira-Mello</i>	
Detailed analyses of three neutron-capture-rich carbon-enhanced metal-poor stars	122
<i>N. T. Behara, P. Bonifacio, H.-G. Ludwig, L. Sbordone, J. I. González Hernández, and E. Caffau</i>	
The 9th magnitude CEMP star BD+44°493: origin of its carbon excess and beryllium abundance	124
<i>Hiroko Ito, Wako Aoki, Satoshi Honda, Timothy C. Beers, and Nozomu Tominaga</i>	
Near-IR spectroscopy of CEMP stars with SOAR/OSIRIS	126
<i>Catherine R. Kennedy, Thirupathi Sivarani, Timothy C. Beers, Silvia Rossi, Vinicius M. Placco, J. Johnson, and T. Masseron</i>	
EMP stars with high mass IMF and hierarchical galaxy formation.	128
<i>Yutaka Komiya, Takuma Suda, Asao Habe, and Masayuki Y. Fujimoto</i>	
High-resolution spectroscopic observations of two chemically peculiar metal-poor stars: HD 10613 & BD+04°2466	130
<i>Claudio B. Pereira and Natalia A. Drake</i>	
A Search for unrecognized carbon-enhanced metal-poor stars	132
<i>Vinicius M. Placco, Catherine R. Kennedy, Silvia Rossi, Timothy C. Beers, Norbert Christlieb, and Thirupathi Sivarani</i>	
A view of the galactic halo using beryllium as a time scale	134
<i>Rodolfo Smiljanic, L. Pasquini, P. Bonifacio, D. Galli, B. Barbuy, R. Gratton, and S. Randich</i>	
Session III. Chemical Abundances in the High Redshift Universe	
<i>Chairs: Guillermo Tenorio-Tagle, Tommy Wiklind</i>	
The cosmic chemical evolution as seen by the brightest events in the Universe	139
<i>Sandra Savaglio (Invited Review)</i>	
Chemical abundances in star-forming galaxies at high redshift	147
<i>Dawn Erb (Invited Review)</i>	
Chemical abundances in planetary nebulae in three different galaxies	155
<i>Miriam Peña</i>	
The chemical history of the nearest starburst galaxy – IC 10	159
<i>Denise R. Gonçalves and Laura Magrini</i>	
Constraining the IGM enrichment history with QSO pairs	163
<i>Evan Scannapieco and Crystal L. Martin</i>	
Possibility of measuring the amount of intergalactic metals with 14-N VII HFS line	167
<i>Dmitrijs Docenko and Rashid A. Sunyaev</i>	
Quasar metal abundances & host galaxy evolution.	171
<i>Fred Hamann and Leah E. Simon (Invited Review)</i>	

Poster Papers

Metallicity of the high-redshift Universe traced by radio galaxies	179
<i>K. Matsuoka, T. Nagao, R. Maiolino, A. Marconi, and Y. Taniguchi</i>	
Lookback time evolution of metals: discarding the closed box model	181
<i>M. Rodrigues, F. Hammer, M. Flores, and M. Puech</i>	
Tracing metallicity in high redshift quasars	183
<i>Leah E. Simon and Fred Hamann</i>	

Session IV. Chemical Abundance Constraints on Mass Assembly and Star Formation in Local Galaxies and the Milky Way

Chairs: Steve Majewski, Ricardo Schiavon, Birgitta Nordström, Paolo Molaro

Session IV.1 Modelling the Stars

Are 'realistic' model atmospheres realistic enough?	187
<i>Bengt Gustafsson (Invited Review)</i>	
Fe I/Fe II ionization equilibrium in cool stars: NLTE versus LTE.	197
<i>Lyudmila Mashonkina, Thomas Gehren, Jianrong Shi, Andreas Korn, and Frank Grupp</i>	
Solar abundances and 3-D model atmospheres	201
<i>Hans-Günter Ludwig, Elisabetta Caffau, Matthias Steffen, Piercarlo Bonifacio, Bernd Freytag, and Roger Cayrel</i>	
Thermohaline mixing in stars - solving the long-standing ^3He problem	205
<i>Corinne Charbonnel and Nadège Lagarde</i>	

Poster Papers

Can we trust elemental abundances derived in late-type giants with the classical 1D stellar atmosphere models?	209
<i>A. Kučinskas, V. Dobrovolskas, A. Ivanauskas, H.-G. Ludwig, E. Caffau, K. Blaževičius, J. Klevas, and D. Prakashavičius</i>	
Problems in abundance determination from UV spectra of hot supergiants	211
<i>M. Sarta Deković, D. Kotnik-Karuza, T. Jurkić, and D. Dominis Prester</i>	
The determination of the abundances of the Fe group elements in early B stars from high resolution FUV Spectra	213
<i>Geraldine J. Peters, Saul J. Adelman, Ivan Hubeny, and Thierry Lanz</i>	
Accurate fundamental stellar parameters.	215
<i>Hans Bruntt</i>	

Session IV.2 Dwarf Galaxies

Abundance patterns and the chemical enrichment of nearby dwarf galaxies	219
<i>Vanessa Hill (Invited Review)</i>	
Complexity in small-scale dwarf spheroidal galaxies	227
<i>Andreas Koch, Daniel Adén, Eva K. Grebel, and Sofia Feltzing (Invited Talk)</i>	

Stellar vs. HII region chemical abundances in nearby galaxies.	233
<i>Fabio Bresolin</i>	
Extremely metal-poor stars in dwarfs galaxies	237
<i>Anna Frebel, Joshua D. Simon, Evan Kirby, Marla Geha, and Beth Willman</i>	
Poster Papers	
Feh-Duf: very high-velocity low-metallicity star with peculiar chemical abundance	241
<i>Natalia A. Drake and Claudio B. Pereira</i>	
Haro15: Is it actually a low metallicity galaxy?	243
<i>Verónica Firpo, Guillermo Bosch, Guillermo Hägele, Ángeles I. Díaz, and Nidia Morrell</i>	
Chemical evolution models for local group dwarf spheroidal galaxies: the evolution of Fe-peak elements	245
<i>Gustavo A. Lanfranchi, Francesca Matteucci, and Gabriele Cescutti</i>	
Abundance gradients and chemical evolution of spiral galaxies	247
<i>Monica M. Marcon-Uchida, Francesca Matteucci, and Roberto D. D. Costa</i>	
<i>Spitzer</i> finds cosmic neon's and sulfur's sweet spot: part III, NGC 6822.	249
<i>R. H. Rubin, I. A. McNabb, J. P. Simpson, R. J. Dufour, A. W. A. Pauldrach, S. W. J. Colgan, T. W. Craven, E. D. Gitterman, and C. C. Lo</i>	
The effect of the corotation on the radial gradient of metallicity of spiral galaxies	251
<i>Sergio Scarano Jr. and Jacques R. D. Lépine</i>	
Session IV.3 The Milky Way	
Chemo-dynamical substructure of the galactic halo	255
<i>Helio Rocha-Pinto (Invited Review)</i>	
Evidence of Omega Cen tidal debris in the Kapteyn moving group	263
<i>Elizabeth Wylie-de Boer, Kenneth Freeman, and Mary Williams</i>	
Structure and kinematics of the stellar halos and thick disks of the Milky Way based on calibration stars from SDSS DR7	267
<i>D. Carollo, T. C. Beers, M. Chiba, J. E. Norris, K. C. Freeman, and Y. S. Lee</i>	
The stellar population of the galactic bulge.	271
<i>Manuela Zoccali (Invited Review)</i>	
Chemical composition of the galactic bulge in Baade's window.	279
<i>Andrew McWilliam, Jon Fulbright, and R. Michael Rich (Invited Talk)</i>	
CNO abundances in the galactic bulge.	285
<i>Nils A. Ryde</i>	
The galactic thick disk: an observational perspective	289
<i>Bacham Reddy (Invited Review)</i>	
The galactic thin and thick disks in the context of galaxy formation	300
<i>Thomas Bensby and Sofia Feltzing</i>	

The stellar population of the thin disk.	304
<i>Carlos Allende Prieto (Invited Review)</i>	
Planetary nebulae and star formation history in the galactic disk and bulge. . . .	313
<i>Yulia Milanova and Alexander Kholtygin</i>	
Metallicity gradients in the Milky Way	317
<i>Walter J. Maciel and Roberto D. D. Costa (Invited Review)</i>	
Modelling the chemical evolution	325
<i>Gerard Hensler and Simone Recchi (Invited Review)</i>	
Chemo-dynamical simulations of galaxies	336
<i>Chiaki Kobayashi (Invited Talk)</i>	

Poster Papers

Chemical similarities between the galactic bulge and local thick disk red giant stars: analysis from optical data.	342
<i>Alan Alves-Brito, Jorge Meléndez, and Martin Asplund</i>	
Metal-poor globular clusters of the galactic bulge.	344
<i>B. Barbuy, S. Ortolani, M. Zoccali, V. Hill, D. Minniti, E. Bica, A. Renzini, and A. Gómez</i>	
Elemental abundances in the galactic bulge from microlensed dwarf stars	346
<i>T. Bensby, S. Feltzing, J. A. Johnson, A. Gould, H. Sana, A. Gal-Yam, M. Asplund, S. Lucatello, J. Melendez, A. Udalski, D. Kubas, G. James, D. Adén, and J. Simmerer</i>	
Fe-peak element abundances in disk and halo stars	348
<i>Maria Bergemann and Thomas Gehren</i>	
Abundance distribution functions for nearby late-type dwarfs.	350
<i>Gustavo A. Bragança, Helio J. Rocha-Pinto, Gustavo F. Porto de Mello, Rafael H. O. Rangel, and Walter J. Maciel</i>	
Atmospheric parameters and chemical abundances for Herbig Ae stars	352
<i>Bruno V. Castilho, Simone Daflon, Marília J. Sartori, and Norbert Przybilla</i>	
Planetary nebulae in the inner Milky Way	354
<i>Oscar Cavichia, Roberto D.D. Costa, and Walter J. Maciel</i>	
Quantitative spectral analysis of hot post-AGB stars.	356
<i>Daniel R. Costa-Mello, Simone Daflon, and Claudio B. Pereira</i>	
Sulfur abundances in Orion B stars	358
<i>Simone Daflon, Katia Cunha, Ramiro de la Reza, Jon Holtzman, and Cristina Chiappini</i>	
On the physical existence of the Zeta Reticuli moving group: a chemical composition analysis	360
<i>Letícia D. Ferreira, Gustavo F. Porto de Mello, and Lício da Silva</i>	
Chemical analysis of B stars within 9 - 11 kpc from the galactic center	362
<i>Maria Isela Zevallos Herencia and Simone Daflon</i>	

Chemical fingerprinting and chemical analysis of galactic halo substructure	364
<i>Steven R. Majewski, Mei-Yin Chou, Katia Cunha, Verne V. Smith, Richard J. Patterson, and David Martínez-Delgado</i>	
Uncovering the evolutionary sequences for the C-J stars based on their chemical abundances	366
<i>Ana Beatriz de Mello and Silvia Lorenz-Martins</i>	
Detailed chemical abundances in a metal-poor stellar stream	368
<i>Ian U. Roederer, Christopher Sneden, Ian B. Thompson, George W. Preston, and Stephen A. Sackett</i>	
Photometric and spectroscopic analysis of the stellar association AB Doradus . .	370
<i>Orlando J. Katime-Santrich, Bruno V. Castilho, Carlos A. O. Torres, and Germano R. Quast</i>	
Nucleosynthesis in the Hyades open cluster: evidence for the enhanced depletion of ^{12}C	372
<i>Simon C. Schuler, Jeremy R. King, and Lih-Sin The</i>	
Lithium abundances in southern associations containing young stars	374
<i>Lício da Silva, Carlos Alberto Torres, Ramiro de la Reza, Germano Quast, Claudio de Melo, and Michael Sterzik</i>	
Investigation of ancient substructures in the Milky Way: chemical composition study	376
<i>Edita Stonkutė, Birgitta Nordström, and Gražina Tautvaišienė</i>	
Investigation of the chemical structure of our galaxy using radial pulsating stars as tracers	378
<i>Marian Doru Suran</i>	
Evolution of [O/Mg], [Na/Mg], [Al/Mg], and [K/Mg] in the Galaxy, from a NLTE analysis	380
<i>M. Spite, F. Spite, P. Bonifacio, V. Hill, S. Andrievsky, R. Cayrel, P. François, and S. Korotin</i>	
FEROS abundance analysis of 21 bulgelike SMR stars	382
<i>Marina Trevisan, Beatriz Barbuy, M. Grenon, B. Gustafsson, and L. Pompéia</i>	
Metal-rich infall onto the inner disk through the interaction between bulge winds and gaseous halos	384
<i>Takuji Tsujimoto and Kenji Bekki</i>	
Superbubble H II regions: how self-enriched should they be?	386
<i>Aida Wofford</i>	
Session V. Extrasolar Planets: the Chemical Abundance Connection	
<i>Chairs: Martin Asplund, Jorge Ramiro de la Reza</i>	
Metallicity and planet formation: models	391
<i>Alan Boss (Invited Review)</i>	
The diversity of extrasolar terrestrial planets	399
<i>Jade C. Bond, Dante S. Lauretta, and David P. O'Brien</i>	

Metallicity and planet formation: observations	403
<i>Jeff Valenti (Invited Review)</i>	
A new spin on red giant rapid rotators: evidence for chemical exchange between planets and evolved stars	408
<i>Joleen K. Carlberg, Steven R. Majewski, Verne V. Smith, Katia Cunha, Richard J. Patterson, Dmitry Bizyaev, Phil Arras, and Robert T. Rood</i>	
Unprecedented accurate abundances: signatures of other Earths?	412
<i>Jorge Meléndez, Martin Asplund, Bengt Gustafsson, David Yong, and Iván Ramírez</i>	
On the frequency of giant planets in the metal-Poor regime	416
<i>A. Sozzetti, D. W. Latham, G. Torres, B. W., Carney, J. B. Laird, R. P. Stefanik, A. P. Boss, and S. Korzennik</i>	
Poster Papers	
Planetary populations according to the orbital angular momentum	420
<i>João A. S. Amarante and Helio J. Rocha-Pinto</i>	
Lithium abundance as a boundary condition for age and mass determination of solar twin stars	422
<i>M. Castro, J.-D. do Nascimento Jr., J. S. da Costa, J. Meléndez, M. Bazot, S. Théado, G. F. Porto de Mello, and J. R. De Medeiros</i>	
Distribution of refractory and volatile elements in COROT planet host stars . . .	424
<i>C. Chavero, R. de la Reza, R. C. Domingos, N. A. Drake, C. B. Pereira, and O. C. Winter</i>	
Photospheric parameters and C abundances in solar-like stars with and without planets	426
<i>Ronaldo Da Silva and André Milone</i>	
Irradiation effects in CO and CO ₂ ices induced by swift heavy Ni ions at 46 MeV and 537 MeV	428
<i>A. Domaracka, E. Seperuelo Duarte, P. Boduch, H. Rothard, E. Balanzat, E. Dartois, S. Pilling, L.S. Farenzena, and E. F. da Silveira</i>	
Light elements in stars with exoplanets	430
<i>E. Delgado Mena, M. C. Gálvez-Ortiz, J. I. González-Hernández, G. Israelian, N. C. Santos, R. Rebolo, and C. Domínguez Cerdeña</i>	
Stellar parameters for a sample of stars with planets	432
<i>Luan Ghezzi, Katia Cunha, Francisco X. de Araújo, Verne V. Smith, Ramiro de la Reza, and Simon Schuler</i>	
On the origin of giant planets and their hosts	434
<i>Misha Haywood</i>	
Photospheric and coronal abundances of solar-type stars with planets: the case of τ Bootis	436
<i>Antonio Maggio, Jorge Sanz-Forcada, and Luigi Scelsi</i>	

Evolution of the abundance of biomolecules in the interstellar medium at the gas phase	438
<i>Eduardo M. Penteado and Helio J. Rocha-Pinto</i>	
Photostability of gas- and solid-phase biomolecules under astrophysical analog soft X-rays field	440
<i>S. Pilling, D. P. P. Andrade, R. T. Marinho, E. M. do Nascimento, H. M. Boechat-Roberty, R. B. de Castilho, G. G. B. de Souza, L. H. Coutinho, R. L. Cavasso-Filho, A. F. Lago, and A. N. de Brito</i>	
Radiolysis of ammonia-containing ices by heavy cosmic rays inside dense molecular clouds	442
<i>Sergio Pilling, Eduardo Seperuelo Duarte, Enio F. da Silveira, Emmanuel Balanzat, Hermann Rothard, Alicja Domaracka, and Philippe Boduch</i>	
Session VI. Abundance Surveys and Projects in the Era of Future Large Telescopes	
<i>Chair: François Spite</i>	
Instrumentation in the ELT era	447
<i>Luca Pasquini (Invited Review)</i>	
The chemo-dynamical history of the Milky Way as revealed by SDSS/SEGUE.	453
<i>Timothy C. Beers (Invited Review)</i>	
How galaxies form: mass assembly from chemical abundances in the era of large surveys.	461
<i>Rosemary Wyse (Invited Review)</i>	
Spectroscopic surveys to measure Galaxy evolution	470
<i>Gerard Gilmore (Invited Review)</i>	
A summary and some concluding remarks.	476
<i>Verne V. Smith</i>	
Poster Papers	
The Apache Point Observatory Galactic Evolution Experiment (APOGEE) in Sloan Digital Sky Survey III (SDSS-III)	480
<i>Steven R. Majewski, John C. Wilson, Fred Hearty, Ricardo R. Schiavon, and Michael F. Skrutskie</i>	
Author index	483

Preface

'Chemical Abundances in the Universe', theme of IAU Symposium 265, is a broad, diverse and rapidly evolving field, due to the ever-expanding capabilities delivered by new arrays of instruments on large telescopes, together with significant advances in modelling and increasing access to large and accurate nuclear, atomic, and molecular databases. In recent years, connections between seemingly different areas in astrophysics have become clearer. For example, the first generation of extremely massive stars that drove reionization left their nucleosynthetic yields chemically imprinted in the oldest low-mass stars, which still exist today. IAU Symposium 265 aimed to provide a unified picture of the production of chemical elements over cosmic time, and how this chemical evolution links together the early Universe of the first stars, through the formation of galaxies and their diverse populations of stars, to a Universe of heavy-element rich stars and planets.

The sessions held during the symposium followed this evolution and provided a framework within which a modern picture of the chemical structure of the Universe could be built. The program started with the Big Bang nucleosynthesis, sailed through the first stars and the reionization era; moved to the discussion of chemical abundances in the high redshift Universe and then closer to home focused on the chemical abundance constraints on mass assembly and star formation in Local Group Galaxies and in particular the Milky Way. The chemical abundance connection was then further explored via the link with the formation of planetary systems.

Even as the observations continue to flow in, and improving analysis tools are used to extract accurate chemical abundances, new classes of extremely large telescopes and instruments are currently being planned. The closing session of Symposium 265 framed the next sets of questions to be posed and highlighted some of the current large programs and future surveys needed to tackle these questions using the next generation of very large telescopes and their instruments, which are already being designed.

IAU Symposium 265 took place during the second week of the IAU General Assembly in the beautiful city of Rio de Janeiro from 10-14 August 2009. A General Assembly, which naturally attracts astronomers from all fields in the astronomical community, was the perfect venue for a symposium that included a variety of topics with chemical abundances being the common link among them. The symposium was very well attended. According to the database collected by the IAU, Symposium 265 was the one with the largest number of participants, as measured from the intention of participation at the time of registration for the General Assembly. The list of participants in these proceedings includes all those who registered for the symposium during the IAU General Assembly. However, it should be noted that since there were many parallel events happening at one time there was a floating audience who attended only parts of the different meetings but the core audience of IAUS265 was quite large.

Due to its broad subject matter the symposium was supported by a number of IAU commissions and two working groups. The SOC membership had a perfect gender balance, and involved most continents, highlighting the importance of international collaborations and interconnections that will be increasingly important to present and future projects in Astronomy.

Last, but not least, we would like to thank the organizers of the IAU in Rio for the local support; the IAU for supporting this symposium and for providing grants; all the participants and in particular the speakers for delivering great talks. Also thanks to all the contributors to these proceedings and to the sponsors of the meeting: the agencies Conselho Nacional de Pesquisas CNPq, under Ministry of Science and Technology, CAPES under Ministry of Education, FAPESP and FAPERJ, and the institutions Observatório Nacional, Rio de Janeiro; National Optical Astronomy Observatory, Observatoire de Paris and Instituto de Astronomia, Geofísica e Ciências Atmosféricas da Universidade de São Paulo.

*Katia Cunha, Monique Spite and Beatriz Barbuy, co-chairs SOC
Tucson, Paris, and São Paulo, December 2009*

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Acknowledgements

The symposium was sponsored and supported by the IAU Divisions IV (Stars), VII (Galactic System), VIII (Galaxies and the Universe); and by the IAU Commissions No. 28 (Galaxies), No. 29 (Stellar Spectra), No. 35 (Stellar Constitution), No. 36 (Theory of Stellar Atmospheres), No. 37 (Star Clusters and Associations), No. 45 (Stellar Classification), No. 53 (Extrasolar Planets).

The Local Organizing Committee acknowledges

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 Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP),
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