

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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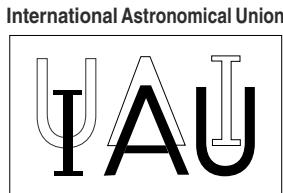
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INTERNATIONAL ASTRONOMICAL UNION  
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# CHEMICAL ABUNDANCES IN THE UNIVERSE: CONNECTING FIRST STARS TO PLANETS

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## 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  
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