Origin and Evolution of the Elements

This comprehensive volume reviews current understanding of the origin and evolution of elements, from stellar nucleosynthesis to the chemical evolution of the cosmos. With chapters by leading authorities in the field, it describes models of how the elements are produced by stars, the nuclear processes involved, and how the quantity of elements evolved in our Galaxy and distant galaxies. The observed chemical composition of stars in defferent locations within our Galaxy and nearby galaxies is discussed, as are the compositions of hot and cold gases, of dust grains found between stars and in meteorites, and of the integrated light from distant galaxies and quasars. This authoritative volume is a valuable resource for graduate students and professional research astronomers.

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This series of four books celebrates the Centennial of the Carnegie Institution of Washington, and is based on a set of four special symposia held by the Observatories in Pasadena. Each symposium explored an astronomical topic of major historical and current interest at the Observatories, and each resulting book contains a set of comprehensive, authoritative review articles by leading experts in the field.

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ORIGIN AND EVOLUTION OF THE ELEMENTS

Edited by

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and

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Introduction

This volume contains the review articles presented at the Carnegie Symposium on *Origin and Evolution of the Elements*, held in Pasadena, February 2003; contributed papers and poster papers presented at the meeting can be obtained online from the Carnegie web site.

Given the pivotal role played by Carnegie astronomers in our understanding and interpretation of spectra of the elements, it was altogether fitting that we celebrate the Carnegie 100 year anniversary with a conference on the origin and evolution of the elements.

In planning the meeting one of our objectives was to connect observers from disparate sub-fields: from those studying microscopic pre-solar grains embedded in meteorites, under laboratory investigation, to observers measuring element abundances in high-redshift clouds, at the largest distance scale, using the world's largest telescopes. Our hope was that by combining groups of researchers with such diverse, but related, interests in element abundances we might foster unexpected connections of interest and benefit to all. We feel that this is particularly relevant at a time when large telescopes are now making it possible to study individual stars in distant galaxies, with detail previously only available for the solar neighborhood, thus blurring the distinction between the study of Galactic evolution and the evolution of galaxies. At the very least we hoped to educate ourselves and to foster an appreciation by our colleagues of the different sub-disciplines of chemical evolution. We also wished to combine the results of observations with theoretical predictions of element yields from stellar sources and galactic chemical evolution models.

Given the great breadth of our field, and the limited time for the conference, it was not possible to include all aspects of the origin and evolution of the elements; for this reason we elected not to cover some important sub-disciplines, such as Big Bang nucleosynthesis.

Andrew McWilliam and Michael Rauch
Carnegie Observatories
December 2003

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