

Foreword

Fifty years passed since the groundbreaking article “Synthesis of the Elements in Stars” written by Burbidge, Burbidge, Fowler and Hoyle (commonly named B²FH, and based on the pionner papers published by Hoyle in 1946 and 1954), and that by Cameron which appeared at the same time (but is much less quoted). These articles had a tremendous impact on the theory of stellar and Galactic evolution, and they remained for long the main reference in the field. But recently a new impetus has been given to the subject, thanks to significant developments, both in theory and in observation, that are opening a new era in our understanding of stellar nucleosynthesis. On the observational side, very large telescopes equipped with powerful instruments, such as multi-objects spectrographs, are gathering unexpected informations on the chemical composition of stars, stellar clusters, interstellar matter, galaxies and the intergalactic medium. These data revolutionize our comprehension of the evolution of stars, and thus of galaxies and their constituents. On the theoretical side also, there have been many breakthroughs, thanks to a new generation of stellar models: these take now into account the effect of atomic diffusion, rotation, internal waves, magnetic fields and mass loss, and they lead to much more reliable predictions of stellar surface abundances and yields.

That is why the Programme National de Physique Stellaire found appropriate and timely to devote to stellar nucleosynthesis the XVIth edition of its Summer School on Stellar Physics. Its program was drafted in collaboration with Isabelle Baraffe, Marie-Jo Goupil, Bertrand Plez and Daniel Schaerer. The school took place December 4–8, 2006 at the Centre Paul Langevin of Aussois, in the French Alps. Eminent specialists of the field kindly accepted to lecture at the school, and to discuss the latest results. We express our warm thanks for their brilliant contributions, there in oral form and here in these proceedings which, we hope, will benefit to many readers.

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