

Foreword

This volume presents a large selection of the lectures which have been given during two consecutive Summer Schools in Stellar Physics (XII and XIII). The first of these schools took place in Aussois, a ski resort in the Alps, on 13-18 October 2002, and it dealt with the formation and the evolution of massive stars. The second was held at Oléron, an island off the Atlantic shore, on 6-10 October 2003, and it focussed on mass loss from stars and on stellar winds. The subjects of these two schools are closely linked, since massive stars lose an important fraction of their mass in the course of their evolution, and that is why we merged the lecture notes in a single volume.

In spite of their relatively small number, massive stars play a key role in several aspects. They are the principal sites of nucleosynthesis, and because most of their matter is ejected by their winds and in the final supernova explosion, they are responsible for the chemical evolution of their host galaxy, and thus of the Universe. They are the main energy providers to the interstellar medium, through their winds and their UV radiation. Finally, since they are very luminous, they can be detected in remote galaxies, delivering precious clues about star formation.

In recent years, one has become increasingly aware that their evolution strongly depends on the mass they lose, and on the internal mixing which is induced by rotation, as was emphasized by two world experts of the subject: André Maeder in Aussois, and Georges Meynet in Oléron. These effects must be taken into account when modeling these stars, or else one misses completely the late stages of evolution.

In massive stars the mass loss occurs through radiation driven winds, whose description has benefited tremendously from the development of new techniques of high angular resolution, and from observation in space. The physical processes involved are now much better understood, and they are being reproduced in the laboratory. Who else than Stan Owocki could we ask to give us such a complete picture of mass ejection, by contrasting these winds blowing from hot stars with those, much less powerful, emitted by solar-type stars?

Beside these principal lectures, several others were devoted to various specific topics: the formation of massive stars, the late phases, rotational mixing, the structure of the winds, the role of binarity, colliding winds, wind diagnostics, even laboratory experiments reproducing radiative shocks.

We hope that the reader will find as much interest in these proceedings as the participants of these schools did in listening to the lectures. We wish to express our warm thanks to all lecturers for the excellent quality of their talks and of their proceedings, and for their disponibility. We thank the Formation Permanente du CNRS and the Programme National de Physique Stellaire for funding these annual Schools on Stellar Physics, and to Frédéric Ménadier, Monique Michel and Mireille Petit for taking care of the organisational aspects.

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