

Conference Review of the
38th LIAC / HELAS-ESTA / BAG
Liège, Belgium, July 7-11 2008

**Evolution and Pulsation of
Massive Stars on the Main Sequence
and Close to it**

A. Grötsch-Noels,¹ J. Montalban,¹ and A. Miglio¹

¹ Institut d'Astrophysique et de Géophysique
Université de Liège, Alle du 6 Août 17 - B 4000 Liège - Belgique

Website : <http://www.ago.ulg.ac.be/APub/Colloques/Liac38/>

Objectives and scientific rationale

The main idea of this colloquium was first, to close in on the problems raised by "nonstandard" physics, second, to focus on the effects of these often missing physical processes on stellar evolution and third, to analyze what asteroseismology could do to shed a new light on these processes and their modeling. The targets are massive stars (O, B, WR) for which new and exciting results are now coming from asteroseismic interpretations of observed modes.

The main objectives were threefold. In a first part, physical processes involved in "nonstandard" modeling such as semiconvection, overshooting and convective penetration, rotation, diffusion,... were analyzed in detail. A second part focused on the problems related to the effect of such "nonstandard" processes on stellar modeling. The third part introduced asteroseismology as a probe of the internal structure of stars, in particular in the frame of present and future asteroseismology missions, from space or ground-based, such as CoRoT, KEPLER, PLATO, SIAMOIS, SONG,...

In what follows, we present a flavor of the topics discussed in seven sessions covering these three parts.

Part 1 : Internal structure of massive stars

Session 1 - Physics and uncertainties in massive stars on the main sequence and close to it

The longstanding problems in hot star's internal modeling such as convection and semiconvection, rotation, overshooting, diffusion and radiative forces,... are analyzed in order to give the audience a good theoretical view on each problem without entering the intricacy of stellar modeling.

Session 2 - Physics and uncertainties and their effects on the internal structure
Each of these aspects influences the models. To what extent? This second session is a critical analysis of standard modeling versus nonstandard modeling. What do we expect?

Part 2 : Outer layers of massive stars

Session 3 - Atmosphere, mass loss and stellar winds

This session deals with the latest results about the physics and modeling of the expanding outer layers of massive stars. The question : To what extent the observations of the expanding atmosphere transposable to the photosphere? In particular, are the observed periods global oscillations of the star or do they find their origin in the atmosphere itself?

Part 3 : Asteroseismology of massive stars

Session 4 - Observed frequencies in pulsating massive stars

This session is devoted to observational asteroseismology of hot stars, gathering of ground-based and space data and their interpretation.

Session 5 - What can asteroseismology do to solve the problems?

What are the asteroseismic signatures of all these physical processes? What can we learn from the driving mechanisms? What about the limits of the convective cores? What about the treatment of semiconvection? What about rotation? Is there a connection between some violent instabilities and mass loss?

Session 6 - What about real stars?

This session is essentially focused on the theoretical calibration of ground-based, MOST and CoRoT targets.

Special session : Future asteroseismic missions

The advancement of the future asteroseismic missions (KEPLER, PLATO, SIAMOIS, SONG) are presented by experts deeply involved in their conception and preparation.