Asteroseismology and Next Generation Stellar Models – EES2014
E. Michel, C. Charbonnel and B. Dintrans (eds)
EAS Publications Series, **73-74** *(2015) 1–2*

FOREWORD

Owing to the great success of the space missions CoRoT and *Kepler*, stellar seismology is living a golden age with an increasing number of studies using asteroseimic data. Seismology is now firmly established as a major tool with which to probe stellar interiors at various phases of evolution and to constrain the physical processes at work therein: microphysics as well as transport mechanisms of chemical species and angular momentum. In addition, several works have already revealed that the benefits of seismology go well beyond the strict domain of stellar structure. Indeed, the possibility of precisely characterizing star-planet systems and studying their interactions is one example. The possibility of estimating masses and radii as well as evolutionary stages for thousands of red giants makes it now possible to extend its application to the study of stellar populations in our galaxy.

Seismic data are thus expected to be a prolific source of information for many studies to come in stellar physics and beyond, either to develop and test new generation stellar models or to characterize stars as components or tracers of broader systems. It thus appears important to help a large scientific community become familiar with this new technique, its theoretical basis, its observational specificities, its diagnostic capabilities, and also its limits.

This volume contains lectures given by world experts in the field during the Ecole Evry Schatzman 2014 (EES 2014) held in Roscoff, France, in September 2014. It is intended for students, researchers and engineers who want to become familiar with stellar seismic investigation, in order to participate in the exploitation of existing data or to prepare future missions and instruments.

The lectures in this volume introduce the theoretical basis of stellar oscillations, the way they are represented mathematically, and the way they reflect the internal stellar structure and the energy exchanges between the star and its pulsations. The observational and analysis techniques are also described, thereby showing how the characteristics of oscillations are captured, measured and converted into seismic diagnostics. The state of the art in terms of stellar models is reviewed, with a special emphasis on the underlying physical ingredients and processes which need to be included or better taken into account in new generation models under the impulsion of observational progress. The impact of seismic information on connected fields is illustrated in the case of stellar population studies. All lectures

DOI: 10.1051/eas/1573001

are illustrated with recent results obtained from CoRoT and *Kepler* data and in the perspective of future observational projects.

The school was sponsored by the Centre National de la Recherche Scientifique (CNRS, Formation Permanente), the Programme National de Physique Stellaire (PNPS) and the Centre National d'Etudes Spatiales (CNES).

We thank the Scientific Organizing Committee as well as Roxane Castanet (DR14) and Isabelle Moro (IRAP) for assisting us in preparing the school, and the staff of the Station Biologique in Roscoff for their warm welcome.

At the moment of concluding this volume, our thoughts go to our dear friends and brilliant colleagues who left us recently, Jean-Pierre Chièze who was on the SOC and participated in this School and Jean-Paul Zahn who organized the Ecole Evry Schatzman between 1997 and 2009. We dedicate this book to them, in deep gratitude for their tremendous contribution to stellar physics and to the PNPS.

E. Michel, B. Dintrans and C. Charbonnel

Lecturers and SOC members.