Curricular Unit

Advanced Physics Topics 1

Module

Asteroseismology

Type

Lecture course

Contact hours

15

Professor/Researcher in charge

Margarida Cunha (CAUP)

Summary of Contents

In this module students are expected to get familiarized with the origin and main characteristics of stellar oscillations present in stars of different masses and ages, as well as with the techniques commonly used to observe them. They should be able to understand the physical problem underlying the description of the oscillations and its mathematical representation. Moreover, they should be able to compute different seismic diagnostics and correctly interpret their meaning.

B1) Introduction (The power of Asteroseismology; Why do stars pulsate? solar-like pulsators vs classical pulsators; Stellar pulsators across the HR diagramme; Observations of stellar pulsations)
B2) Basic properties of the oscillations (The equations for adiabatic oscillations; p-modes and g-modes; Changes in mode properties with stellar evolution)
B3) Seismic inferences (The range of stellar pulsations - frequency of maximum power and cutoff frequency; The large and small separations; Echelle diagram; Scaling relations; Forward modeling and inversions)

References

C. Aerts, J. Christensen-Dalsgaard, D. Kurtz; Asteroseismology, Springer Publishing. 1st Edition July 25th, 2011. ISBN: 978-1-4020-5178-4
Sara Seager; Exoplanets, 2011. ISBN: 978-0-8165-2945-2
Michael Perryman; The Exoplanet Handbook, Cambridge University Press, 2014

Evaluation

Written test, practical work.

Juri

Margarida Cunha.