

Jeudi 7 décembre 2023 à 11h (IAS, bâtiment 121, salle 1-2-3)

Seismology of Red Clump stars

Anthony Noll (Heidelberg Institute for Theoretical Studies)

Stars in the red clump (RC) are low-mass, core-helium burning stars which went through the He-flash. They are targets of significant astrophysical importance, as they can be used as standard candles (thanks to their narrow range of luminosity), tracers of the chemical evolution of the Galaxy and are the progenitors of later stages of evolution such as white dwarfs. Due to the numerous uncertainties associated with the physical processes happening in the core of the RC stars, and during the helium flash, modeling them is particularly challenging. Fortunately, RC stars are solar-like oscillators, which means that their modes are excited by the turbulent movement of the convective envelope. Furthermore, these modes are mixed: they behave as gravity modes in the inner region and pressure modes in the outer region of the star. Thanks to that, the study of these modes (or asteroseismology) allows us to constrain the physical processes happening in the core of the star. In this talk, I will particularly focus on the core boundary mixing and the nuclear reaction rates, as both are particularly important to correctly model RC stars but are still ill-defined. I will show how the relation between the seismic properties of RC stars and the properties of these processes, and how asteroseismology can help us to put constraints on them.