

Jeudi 26 juin 2025 à 11h (IAS, bâtiment 121, salle 1-2-3)

Asteroseismology as a probe of angular momentum transport in stars: the case of red giants

Charlotte Gehan (IRAP)

Understanding how angular momentum (AM) is transported in stars remains a major challenge. Indeed, models are still unable to accurately reproduce the internal rotation measurements that have been obtained for thousands of stars through space-based asteroseismology and tend to predict rotation rates that are much faster than the measured values. This disagreement indicates that significant AM transport is at work inside stars, the physical mechanisms of which are not yet well understood. However, rotation impacts the lifetime of stars by bringing more chemical elements into the core, which undergoes nuclear fusion reactions during the main-sequence evolution stage. Hence, understanding AM transport is of crucial importance not only for stellar physics, but also for fields relying on the precise and accurate determination of stellar ages, such as exoplanetology and Galactic archaeology. In this context, red giants represent an ideal laboratory, as the physical conditions are met in their interior to couple pressure waves in the external envelope with gravity waves in the interior, giving birth to so-called mixed oscillation modes. Such mixed modes carry direct information on the physical properties of the core, offering the opportunity to probe the mechanisms that transport AM in this otherwise largely inaccessible region. I will begin by reviewing our current understanding of AM transport in red giants, based on asteroseismic core rotation measurements and models. I will then present an innovative modelling approach that allows us to identify the regions inside red giants from which AM is mostly extracted, which is crucial for eventually identifying the physical mechanisms that are responsible for the AM transport.