Jeudi 21 septembre 2023 à 11h (IAS, bâtiment 121, salle 1-2-3)

Gravity waves in stars: an essential probe of the deep interior and a key player of the dynamics

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Stars are huge spheres of plasma that produce their luminosity from core nuclear reactions and whose evolution is shaped by a complex internal multiscale dynamics (e.g., convection, magnetic fields, global circulation). Studying their evolution is not only important to test fundamental physics in extreme environments, but also to understand the evolution of more complex systems as planetary systems or galaxies. For the two last decades, space asteroseismology has permitted a revolution in the field. Using the exquisite light curves collected by the satellites CoRoT, Kepler and now TESS, we have been able to probe the internal properties of thousands of stars at different stages of their evolution. Among different successes is the detection of gravity waves in evolved red giant stars. These waves, whose restoring force is buoyancy, can propagate into the inner layers of stars and thus bring us information about these very deep regions, which remain inaccessible by any other means. These observational constraints highlighted our ignorance regarding the processes responsible from the redistribution of angular momentum and chemical elements, which can significantly affect the evolution speed of stars. In turn, this also has repercussions on the age-dating of stars, which currently stands for the most precise clock in our galactic environment. Different MHD processes are studied today to solve the issue. Funny enough, in addition to have raised many questions about our current stellar evolution codes, gravity waves are known to be part of these dynamical processes. Indeed, during their propagation in stars, these waves are damped by thermal diffusion and can exchange heat, energy and momentum with the medium, and thus change the properties of this latter. In this talk, I will give a brief overview about the seismic constraints that gravity waves can bring us on stellar interiors, as well as about our current knowledge on the potential of these waves to affect the internal dynamics.