The influence of rotation and magnetism on the stochastic excitation of acoustic modes in solar-type stars

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Amplitudes of acoustic modes in solar-like stars are intrinsically linked to the properties of turbulent convection in their envelope, which acts as their excitation source. Their detection is the best way to determine the key global properties of these stars (i.e. their masses and their radius) and their age. These pieces of information are essential to properly characterize their planetary and galactic environment. Recent observational works using results of the *Kepler* space mission, showed that acoustic modes' signals are not detected in a large fraction of solar-type stars, where they are nevertheless expected because of their convective envelope. This non-detection is a function of both stellar magnetism and rotation. One hypothesis is that the excitation source term is too low to trigger the oscillations. In addition, observations of solar-type stars show that the amplitudes of these stellar acoustic modes are modulated along their magnetic activity cycles. A key to understanding these observations could be to remember that rotation and magnetic fields strongly influence convection. Their action is most of the time ignored in the models that allow astrophysicists to predict acoustic modes' amplitudes.
To assess the impact of rotation and magnetic field, we extend the state-of-the-art of the formalism describing the stochastic excitation of stellar acoustic modes. We show that the turbulent source terms are modified by the presence of rotation and magnetism. We illustrate how the acoustic waves amplitudes are modulated, depending on their rotation period and their magnetic activity. This work helps predict their detectability in rotating magnetic solar-like stars, which is paramount to preparing the forthcoming space missions in asteroseismology, such as *PLATO*.