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(U*) (POS-34) Asteroseismology: Unveiling Stellar Nature Through Oscillation Pattern Recognition

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Solar-like stars oscillate as a result of sound and gravity waves that propagate through the sphere; the waves allow us to then probe the stellar interior for information on its physical properties. These stars will evolve off the main sequence to the red giant branch (RBG) and subsequently either to the red clump or secondary red clump stages depending on their mass. Additionally, some solar-like stars, that we have yet to understand, have low-amplitude (ℓ=1) oscillation modes, dubbed "depressed"stars. Asteroseismology allows us to disentangle the classifications of these stellar evolutionary stages as red giant star populations, on the Hertzsprung-Russell diagram, tend to overlap between these regions. With the amount of currently available data, it is necessary to automate the classification process. Using a machine learning-based method, I worked to automate this disentanglement by using seismic data from stellar oscillations, since oscillatory patterns are characteristic of stellar age, to further sort these stars according to their evolutionary history. In this research, I have performed the classification of about 18,000 evolved stars, observed during the Kepler mission, based on their oscillation patterns; this is the largest sample of red giants that has been classified automatically and will allow for better studying of the interior dynamics of evolving solar-like stars.

Keyword-1

Asteroseismology

Keyword-2

Astrophysics

Keyword-3

Oscillation

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