

Pulsating subdwarf B stars in the oldest open cluster NGC6791

NGC6791 is the oldest metal rich ($[Fe/H]=0.4$) open cluster with an age of 8Gyr. The evolution of this cluster is still an enigma. Subdwarf B stars are extreme horizontal branch core helium burning objects with a very thin hydrogen envelope. We study the evolution of subdwarf B stars in this cluster by means of asteroseismology to derive the parameters of the stars. We have analyzed Kepler super apertures long cadence data of the NGC6791 to search for pulsating sdB stars. We checked all pixels and found only three sdB stars to be pulsating, KIC2569576 (B3), KIC2438324 (B4), and KIC2437937 (B5) in NGC6791. These stars were known before, though we extended the data coverage detecting more frequencies and features in periodograms such as new multiplets, extended period spacing sequences, and candidates for trapped modes. The remaining known sdB stars do not show any light variation, while no new variable sdB is found in NGC6791. We calculated evolutionary tracks and eigenfrequencies of pulsation modes using the new algorithms available in MESA and GYRE modules. We used double optimization algorithms to match the observations and models. Using the asteroseismic interpretations from observed multiplets and spectroscopic observations on the $\log g$ and T_{eff} values, we found the optimal models matching in HR diagrams and best fitting periodograms. The best models representing the observed properties of the stars used for determination of fundamental parameters. Hence inferring the parameters like age and metallicity of the clusters they reside in.

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