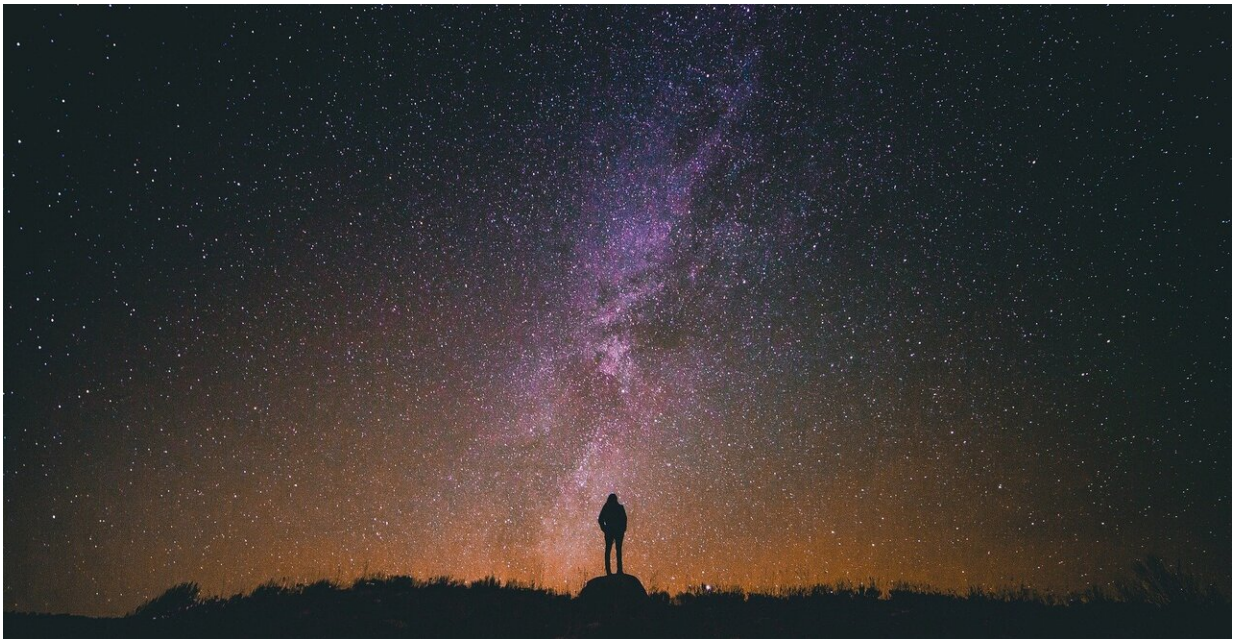


# Researchers reveal evolution state of medium-amplitude $\delta$ Scuti KIC 1573174

July 5 2022, by Li Yuan

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Ph.D. student Lv Chenglong from the Xinjiang Astronomical Observatory (XAO) of the Chinese Academy of Sciences (CAS) and his collaborators have revealed the evolutionary state of  $\delta$  Scuti KIC 1573174 by constructing stellar models with four radial pulsation frequencies.

The results were published in *The Astrophysical Journal* on June 14.

The  $\delta$  Scuti stars provide rich oscillation modes in observations, and both radial and non-radial oscillation have been detected in the amplitude spectra. Different modes show different propagation behaviors in the star and reflect different properties of the stellar structure.

The researchers found that the KIC 1573174 is a quadruple mode  $\delta$  Scuti star. Due to the existence of multiple pulsation periods, the traditional period analysis method cannot accurately obtain the period variation of the star, so a different approach has been used to determine the period variation through the study of phase modulation.

The change of [period](#)  $(1/P)dP/dt$  is obtained, and the fundamental [frequency](#) and first overtone frequency were  $-1.14 \times 10^6 \text{ yr}^{-1}$  and  $-4.48 \times 10^6 \text{ yr}^{-1}$ , respectively. Based on the four radial frequencies, a series of theoretical models were obtained by employing the stellar evolution program MESA. The ratio of observed fundamental frequency and first overtone frequency is larger than that of the model, which may be caused by the rotation of the star.

Moreover, the model results showed a consistent evolutionary state for medium- and high-amplitude  $\delta$  Scuti stars. The proposed objective could help to investigate the difference and connection between high-amplitude and low-amplitude  $\delta$  Scuti stars more deeply.

**More information:** Chenglong Lv et al, Frequency Analysis of KIC 1573174: Shedding Light on the Nature of HADS Stars, *The Astrophysical Journal* (2022). [DOI: 10.3847/1538-4357/ac69d9](https://doi.org/10.3847/1538-4357/ac69d9)

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