

Explained in 60 Seconds: Timescales of Stellar Oscillations

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Keywords

*Asteroseismology, Pulsating Stars, Stellar
Time Scales, Stellar Oscillations*

For the most part the stars are constants in our lives and are often perceived as only changing on timescales of billions of years. However, the brightnesses of stars can vary over a period of time that you could measure on your watch.

The hour hand: it takes half a day to complete one full revolution — in other words it has a frequency of two cycles per day. This is roughly the same timescale as the bright-

ness variation in a red giant star five times the diameter of the Sun.

The minute hand: it completes one cycle in an hour and illustrates the time it takes for a red giant twice the diameter of the Sun to vary in brightness.

The Sun is oscillating with a period of five minutes — a typical coffee break.

The fast-moving second hand can be a good proxy for the variability of a white dwarf. These densely packed objects are about one tenth of the Sun's size, and have brightness variation periods of 100 to 1200 seconds.

Variability timescales give a good indication of the density of a star. Periods can range from between a few hundred seconds in very dense objects to several hundred days for stars with a low density like Mira, a red giant with a diameter one hundred times that of the Sun.



Figure 1. Comparing stellar time scales to something known by everyone: a watch. Credit: Chris Roach.