Tracing early stellar evolution with asteroseismology: pre-main sequence stars in NGC 2264

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Abstract

The earliest phases in the lives of stars define their complete evolutionary path until their death. Therefore, understanding the physical processes that occur in these early stages is essential. Although we have a general concept of how stars are formed and evolve, our current knowledge of early stellar evolution is limited. Asteroseismology has been proven to be a successful tool to unravel details of the internal structure for different types of stars in various stages of evolution well after birth. We can now show that it has similar power for pre-main sequence objects. Using the CoRoT observations of NGC 2264 obtained during the two Short Runs SRa01 in 2008 and SRa05 in 2011/12, several delta Scuti and gamma Doradus type pulsating pre-main sequence stars have been detected and analyzed. The combination of CoRoT data with measurements obtained by the MOST and Spitzer space telescopes during the CSI2264 campaign and with high-resolution spectroscopy from ground allowed for the first time to probe early stellar evolution with asteroseismology. Here we present the latest results showing evidence for a relation between the pre-main sequence stars' oscillatory behaviour and their relative ages.

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