The evolutionary nature of RV Tauri stars with a disc

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Abstract

RV Tauri stars are a group of pulsators which occupy the high luminosity end of the population II Cepheids. They are generally assumed to be in a post-AGB stage of evolution and evolving towards the PNe stage. We carried out a radial velocity study to probe the binary status of 6 such RV Tauri stars in the Galaxy. The objects were chosen to have warm circumstellar dust which is likely trapped in a disc. Our results show that all the 6 RV Tauri stars are binaries with orbital periods ranging from ¿ 650 to 1700 days and eccentricities between 0.2 and 0.6. The derived mass functions point to unevolved low-mass companions. We used the pulsations to constrain their luminosities via a calibrated PLC relation and thus placed them on the HR diagram. Our derived stellar luminosities show that 4 of them are indeed post-AGB binaries but the rest are less luminous than the tip of the Red Giant Branch (RGB). We conclude that these are likely candidates of the newly discovered post-RGB objects. The evolution of these evolved star was affected by a strong phase of binary interaction. Our results also corroborate the finding that evolved stars surrounded by a dusty disc are all binaries.

Keywords: Rv Tauri stars, post, AGB binaries, Disc

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