Contribution ID: **74** Type: **Talk**

The initial-final mass relation from carbon stars in open clusters

Monday 10 June 2024 11:50 (20 minutes)

Recently (Marigo et al. 2020-22), identified a kink in the initial-final mass relation around $M_i \simeq 1.65 - 2.10$ $M_\odot$, based on Gaia DR2 and EDR3 data for white dwarfs in open clusters aged 1.5-2.5 Gyr. Notably, wide dwarfs at this kink, all from NGC 7789, exhibit masses of $\simeq 0.70 - 0.74$ $M_\odot$, usually associated with stars of $M_i \simeq 3 - 4$ $M_\odot$. The above kink in the M_i mass range coincides with the theorerically acepted solar metallicity lowest-mass stars evolving into carbon stars during the AGB phase. According to our explanation, these carbon stars likely underwent shallow third dredge-up events, resulting in low photospheric C/O ratios and, as a consequence, midle stellar winds. Under such conditions, the AGB lifetime is prolonged allowing for greater core mass growth beyond typical predictions.

We have analyzed chemically a few carbon stars belonging to open clusters with the above cluster ages. Our chemical analysis confirms that the carbon stars found within the kink exhibit markedly low photospheric C/O ratios and stellar winds, and the typical chemical composition expected for carbon stars of near solar metallicity, thus validating our theoretical predictions. However, we also show that this conclusion is strongly dependent on the derived stellar luminosity of these carbon stars.

Primary author: ABIA, Carlos (University of Granada)

Co-author: MARIGO, Paola (Istituto Nazionale di Astrofisica (INAF))

Presenter: ABIA, Carlos (University of Granada)

Session Classification: AGB structure, evolution and nucleosynthesis