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Evolution and final fate of stars in the transition between AGB and Massive Stars

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According to a standard initial mass function, stars in the range 7-12 Msun constitute $\sim 50\%$ (by number) of the stars more massive than 7 Msun. Despite this, their evolutionary properties, particularly their final fate, remain mostly understudied. In this talk I will present some of the results published in our recent paper, where we discussed in details the evolutionary properties of solar metallicity, non rotating, stars in the range 7-15 Msun, from the pre-main sequence up to the pre-supernova stage or up to an advanced stage of the thermally pulsing phase, depending on the initial mass. Our findings revealed several key points: (1) the 7.00 Msun develops a degenerate CO core and evolves as a classical AGB star; (2) stars with initial mass M $\geq$ 9.22 Msun end their life as core collapse supernovae; (3) stars in the range 7.50 $<$M/Msun $<$ 9.20 develop a degenerate ONe core and evolve through the thermally pulsing SAGB phase; 4) stars in the mass range 7.50 $\leq$ M/Msun $\leq$ 8.00 end their life as hybrid CO/ONe- or ONe-WD; (5) stars with initial mass in the range 8.50 $\leq$ M/ Msun $\leq$ 9.20 most likely achieve the central densities in excess of the threshold value for the activation of the electron capture on 20Ne before losing the entire H-rich envelope and therefore may potentially explode as electron capture supernovae.

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