Diffusive overshooting in hot bottom burning AGB models

T. Driebe, T. Blöcker
(Max-Planck Institut für Radioastronomie, Auf dem Hügel 69, D-53121 Bonn, Germany)
F. Herwig, D. Schönberner
(Astrophysikalisches Institut Potsdam, An der Sternwarte 16, D-14482 Potsdam, Germany)

The concept of diffusive overshooting based on hydrodynamical simulations of convection zones (Freytag et al., A&A 313, 497, 1996) has recently been introduced to AGB models. For a 3 $M_\odot$ AGB model sequence, Herwig et al. (1997, A&A 324, L81) found with this prescription of additional slow mixing substantial dredge up, i.e. the production of carbon stars for relatively low masses. This scheme leads as well to the formation of a ^{13}C pocket which is required to drive the s-process in these stars.

In this study we focus on the influence of exponential diffusive overshoot on more massive AGB models which suffer from hot bottom burning (HBB), i.e. the penetration of the envelope convection into the hydrogen-burning shell. It is well known that HBB leads to the break-down of the core-mass luminosity relation, to the formation of Li-rich AGB stars and to the, at least temporary, prevention of the carbon-star stage due to CN cycling of the by dredge-up episodes carbon-enriched envelopes. However, the efficiency of HBB depends considerably on the treatment of convection.

We calculated model sequences for initial masses of 3 ... 6 $M_\odot$ from the main sequence through the AGB considering diffusive overshoot in all evolutionary stages and convection zones. We discuss onset and strength of HBB in these models and differences to standard calculations without overshoot.