



Figure 13.13 The AGB and post-AGB evolution of a $0.6 M_{\odot}$ star undergoing mass loss. The initial composition of the model is $X = 0.749$, $Y = 0.25$, and $Z = 0.001$. The main-sequence and horizontal branches of 3 , 5 , and $7 M_{\odot}$ stars are shown for reference. Details of the figure are discussed in the body of the text. (Figure adapted from Iben, *Ap. J.*, 260, 821, 1982.)

asymptotic giant branch before the onset of helium shell flashes. The position of the star on the H–R diagram at the start of each flash episode is indicated by a number next to the evolutionary track (eleven pulses in all), with the resulting excursions in luminosity and effective temperature indicated for pulses 7, 9, and 10. It is after the tenth pulse that the star leaves the AGB, ejecting its envelope as a planetary nebula during the nearly constant luminosity path across the H–R diagram. The amount of mass remaining in the hydrogen-rich envelope is indicated in parentheses along the evolutionary track (in M_{\odot}). Also indicated is the amount of time before (negative) or after (positive) the point when the star’s effective temperature was 30,000 K (the time is measured in years). Following the eleventh helium shell flash, the star finally loses the last remnants of its envelope and becomes a white dwarf of radius $0.0285 R_{\odot}$.²⁰

²⁰The line labeled “Fundamental Blue Edge” corresponds to the high-temperature limit for fundamental mode pulsations of a class of variable stars known as **RR Lyraes**. This important class of objects will be discussed extensively in Chapter 14.