

# Nuclear Physics I: Nuclear Astrophysics

## PHYS 8801

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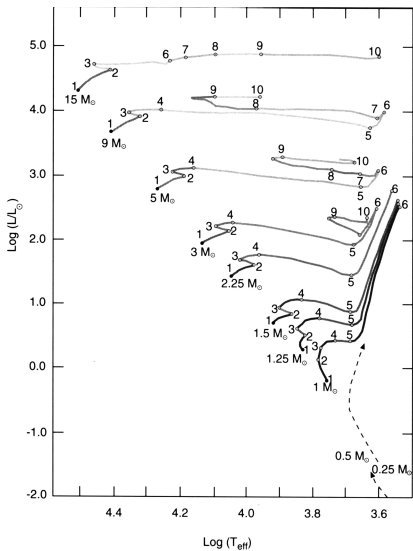
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# Agenda

- 1 Evolution in the HRD
- 2 Stellar Fates
  - Remnants as a Function of Mass
  - Remnants as a Function of Mass and Metallicity

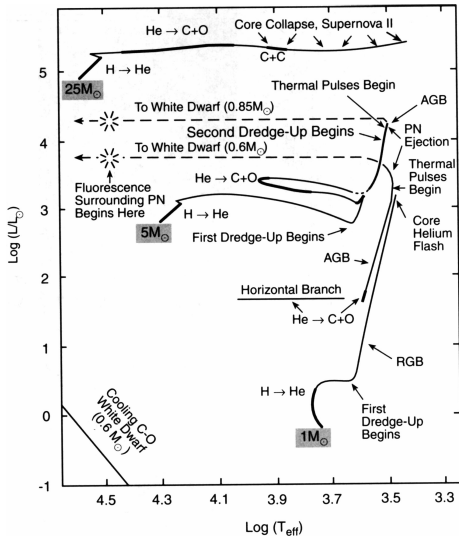
## Evolution tracks and lifetimes

**Table 8.4** Evolutionary lifetimes (years)

| $M/M_{\odot}$ | 1-2    | 2-3    | 3-4    | 4-5    | 5-6    | 6-7    | 7-8    | 8-9    | 9-10   |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 15            | 1.0(7) | 2.3(5) | ←      | 7.6(4) | →      | 7.2(5) | 6.2(5) | 1.9(5) | 3.5(4) |
| 9             | 2.1(7) | 6.1(5) | 9.1(4) | 1.5(5) | 6.6(4) | 4.9(5) | 9.5(4) | 3.3(6) | 1.6(5) |
| 5             | 6.5(7) | 2.2(6) | 1.4(6) | 7.5(5) | 4.9(5) | 6.1(6) | 1.0(6) | 9.0(6) | 9.3(5) |
| 3             | 2.2(8) | 1.0(7) | 1.0(7) | 4.5(6) | 4.2(6) | ←      | 6.6(7) | →      | 6.0(6) |
| 2.25          | 4.8(8) | 1.6(7) | 3.7(7) | 1.3(7) | 3.8(7) |        |        |        |        |
| 1.5           | 1.6(9) | 8.1(7) | 3.5(8) | 1.0(8) | >2(8)  |        |        |        |        |
| 1.25          | 2.8(9) | 1.8(8) | 1.0(9) | 1.5(8) | >4(8)  |        |        |        |        |
| 1.0           | 7.0(9) | 2.0(9) | 1.2(9) | 1.6(9) | >1(9)  |        |        |        |        |

Note: Powers of 10 are given in parentheses.

## Stellar evolution in the HRD







# Remnants - Mass and Metallicity

