globcls.cmds.ps

From F. D'Antona 1999

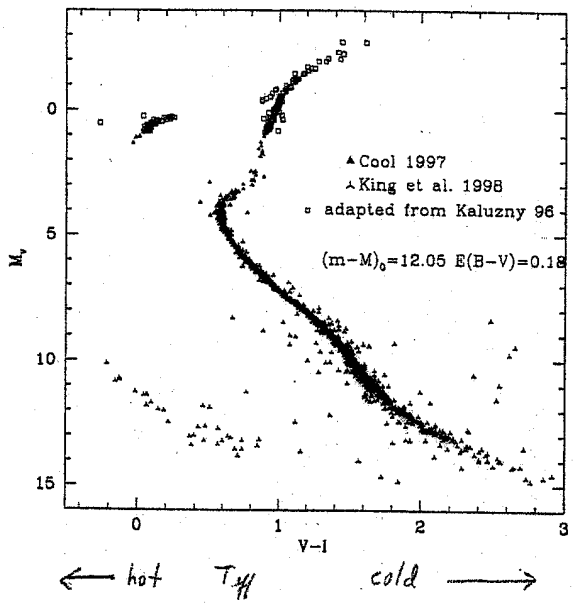


Figure 1: Composite HR diagram for the stars in NGC6397. The upper part is adapted from Kaluzny 1997, the giants and turnoff data are from Cool 1997, and the main sequence down to its low end, plus the white dwarfs are from King et al. 1998.

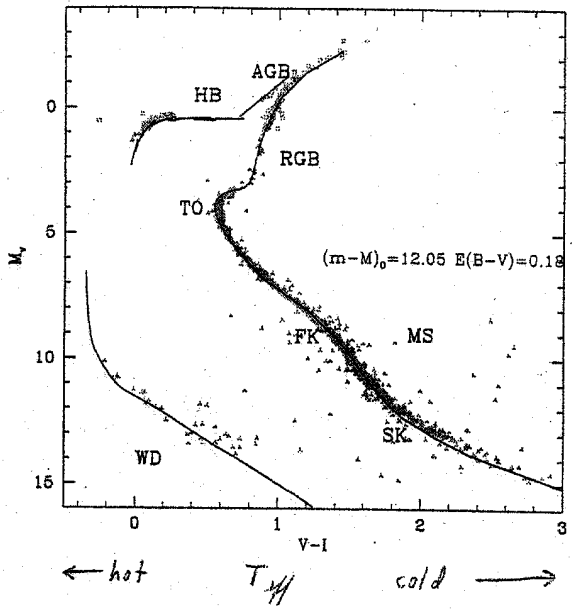


Figure 2: Main evolutionary and structural phases in the HR diagram: WD: $0.5M_\odot$CO cooling track from Wood 1995; MS: from Baraffe et al. 1997 (BCAH97) for [M/H]=−1.5; TO+RGB: 12Gyr isochrone from Silvestri et al. 1998; HB from Caloi et al. 1997; AGB is schematized.

"Isochrone" evolutionary states of stars of variety of initial masses, seen at same age.

But TO → RGB → HB → WD (hot) so rapid that all ≃ same mass.

⇒ isochrone ≃ evolutionary sequence of star of single initial mass = turnoff mass.

All stars ~ 12 Gyr old, metal abundance ~ $\frac{1}{100}$ solar. NGC 6397 globular cluster

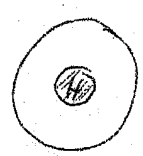
Current max mass still on main sequence ~ $0.8 M_\odot$

Phases of evolution of single stars ($M \leq 1.7 M_\odot$)

time

slow

MS : Main sequence - core H "burning" → He

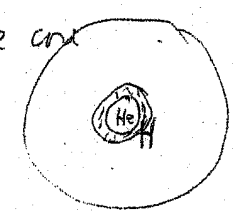


FK "First kind" 5000K, H_2 in envelope

SK "Second kind" - core degenerate

TO : "Turn Off" - core H begins to exhaust - star expands and cools (brighter, cooler), core contracts, heats

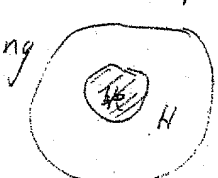
RGB: Red giant branch - H burning in shell around degenerate He core



fast

HB : Horizontal branch ("red clump" for metals ~ solar)

· Core helium burning



→ C/O

AGB: Asymptotic giant branch - Helium burning in shell around degenerate C/O core
- Extreme mass loss in wind

WD: White dwarf. (C/O)