

Exercises I

0. Repetition: Read Appendix A & B in P. Schneider/Extragalactic Astronomy
1. Two astrophysical objects at a distance of 7 Mpc have an apparent V-band magnitude of $m_V = 8.4$ and 10.
 - Which of them is brighter?
 - Calculate their absolute magnitudes and luminosities (V-band).
 - If the objects were four times as distant, what would be their apparent magnitudes?
 - Imagine both objects are also observed in the U-band, with an apparent magnitude for both of $m_U = 13$, what are the U-V colors and which one is redder/bluer?
2. Assume you have an O5, a B5, and a G2 (like sun) MS star with solar metallicity.
 - Place them qualitatively in the Hertzsprung Russel diagram. What are their masses, luminosities and temperatures? Which is the reddest and bluest star?
 - Describe for each star what happens after leaving the MS, also physically inside the star, and what are possible end states. Draw typical evolutionary paths in the HR diagram and explain changes in Luminosity/Temperature (read the related appendix section of P. Schneider's book).
 - How (and why) would the evolutionary paths in the HR diagram qualitatively change, if the metallicity of each star was only 1/10 solar?