

The star HA 126 has a spectral class of G8.

a) its intrinsic color is  $(B-V)_0 = +0.58$

However, when astronomers observe this star in the B and V passbands, they measure magnitudes

$$B = 9.98$$

$$V = 8.04$$

b) the observed color of the star is  $(B-V) = +1.94$

c) to find the color excess  $E(B-V)$ , subtract the intrinsic color from the observed color:

$$E(B-V) = (B-V) - (B-V)_0 = 1.94 - 0.58 = 1.36$$

The color excess  $E(B-V)$  is related to the extinction in the B and V passbands via coefficients you can look up (they are based on the way that light of different wavelengths is scattered by dust).

d)  $A_B = 4.3 E(B-V) = 4.3 (1.36) = 5.85 \text{ mag}$

e)  $A_V = 3.3 E(B-V) = 3.3 (1.36) = 4.49 \text{ mag}$

If space were a perfect vacuum, without dust, there would be no extinction. In that case, HA 126 would have an apparent magnitude of

f)  $V_0 = V - A_V = 8.04 - 4.49 = 3.55 \text{ much brighter!}$