Recitation 11

Week of 29 November 2011

Useful equations and constants:

Hubble’s Law \( V = H_o D \) where \( H_o = \frac{20 \text{ km/sec}}{\text{Mly}} \)

Doppler Shift \( \lambda = \lambda_o \left( 1 + \frac{V}{c} \right) \) or \( V = c \left( \frac{\lambda}{\lambda_o} - 1 \right) \)

1 ly = 9.46 x 10\(^{15}\) m = 9.46 x 10\(^{17}\) cm

1 Mly = 10\(^6\) ly

Problems:

1. You measure a galaxy to be 2\( x 10^9\) ly away. What is the velocity of the galaxy according to you in km/s?

2. A quasar is observed to have a spectral redshift corresponding to a speed of 2.95\( x 10^9\) cm/s. How far away is the quasar?
3. A certain galaxy is seen to be receding from us at 10% of the speed of light. Approximately, how far away is the galaxy from us (in millions of light years)?

4. In observations of a certain galaxy, a spectral line that has a rest wavelength of $5.00 \times 10^{-4}$ cm appears instead at wavelength $5.10 \times 10^{-4}$ cm. How far away is the galaxy, in millions of light years?