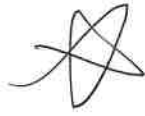


Redshift / Blueshift HO



Station 1: Historic Galaxy Spectra

Read the article describing how to interpret the spectra images. Once you have done so, please use the spectra images to answer the questions below.

1. Explain what astronomers measure in each spectra to determine the direction and speed of the galaxy.

Astronomers use the negative and positive velocity to determine direction and speed of a galaxy. How well the lines match up with each other

2. Given your knowledge of the images, which colors of the rainbow must be on the left and right sides of the spectra?

The left should be blue and right should be red

3. As galaxies have more and more redshift, how would you expect their velocities to change?

their velocities would get higher as they would be much farther away from earth

4. The top galaxy spectrum is quite thick and they get progressively thinner as you go down the page. What do you think is the cause of the different galaxy spectra thicknesses?

Since they are farther they emit less light so there is a smaller sample size.

Station 2: Calculating the Velocities of Galaxies

Use the spectra and instructions at the station handout to fill out the table below and calculate how fast these galaxies are moving **and** which direction they are moving.

Galaxy Spectral Shift Table				
Galaxy	Hydrogen Spectral Line Location (nm)	Wavelength Shift (nm)	Velocity (km/s)	Direction (Away or Closer)
Virgo A	658.8 nm	2.8 nm	1280.5 km/s	away
M65 Spiral in Leo	659.7 nm	1.7 nm	777.4 km/s	away
Andromeda	656.1 nm	-0.6 nm	-274.4 km/s	closer
Human Eye	1 nm	1 nm	457.3 km/s	---

Station 3: Redshifting Galaxies from Universe Expansion

Galaxy	Redshift (km/s)	Distance (Mpc)	Distance in lightyears
A	2500	38.9	128,700,000
B	13500	209.3	689,700,000
C	3900	60	198,000,000
D	7400	115	379,500,000
E	9600	149	491,700,000

Step 3: How far does an object need to be in order for Universal Expansion to be visible to the human eye?

~ 38 mpc or 115,500,000 light years away

Step 4: Can we use telescopes to see stars affected by Universal Expansion?

I don't think so, less than 115,500,000 > 100,000,000 ly

Station 4: Finding Exo-planets through Redshift - Blueshift

After reading the article online, please work together as a small group to answer the questions below.

1. What causes the redshift and blueshift in the radial velocity method?

The planet and star pull on each other causing a wobble effect creating both a red and blue shift

2. What is an exoplanet?

An exoplanet is any planet that orbits a star outside of our solar system

3. What are two advantages of the Radial Velocity Method?

Ease of access and ground use

4. Using the blue graph, what do you think is the Period of the 51 Pegasi exoplanet?

P = 4.231 days

5. What are two disadvantages of the Radial Velocity Method?

Can't determine mass and can possibly pick up stars