

As we collect data from the object. We will be looking at the spectrum from the galaxy in the slit of the spectrometer. The spectrum of the galaxy will exhibit the characteristic H & K calcium lines which would normally appear at wavelengths $3968.5 \approx$ and $3933.7 \approx$, respectively, if the galaxies were not moving. However, the H & K lines will be red shifted to longer wavelengths depending on how fast the galaxy is receding.

Photons are collected one by one. We must collect a sufficient number of photons to allow identification of the wavelength. Since an incoming photon could be of any wavelength, we need to integrate for some time before we can accurately measure the spectrum and draw conclusions. The more photons collected, the less the noise in the spectrum, making the absorption lines easier to pick out. To initiate the data collection, press **start/resume count**.

8. To check the progress of the spectrum, click the **stop count** button. The computer will plot the spectrum with the available data. Clicking the **stop count** button also places the cursor in the measurement mode. Using the mouse, place the arrow anywhere on the spectrum, press and hold the left mouse button. Notice the arrow changes to a cross hair and the wavelength data appears at the top of the display. As you hold the left mouse button, move the mouse along the spectrum. You are able to measure the wavelength and intensity at the position of the mouse pointer.

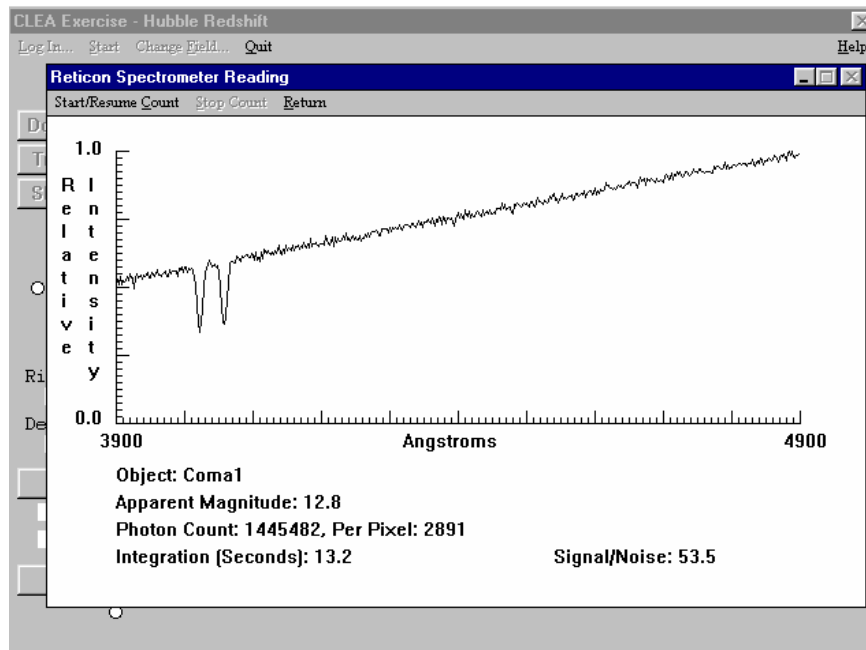


Figure 2:
Spectrometer Reading Window

Information that appears in the lower left hand portion of the window

Object: the name of the object being studied

Apparent magnitude: the visual magnitude of the object

Right Ascension: Displays the celestial coordinates of the center of the field of view. Right Ascension is displayed in hours, minutes and seconds.

Declination: Declination is displayed in degrees, minutes and seconds.

Information that appears in the lower right hand portion of the window

Integration (seconds): The number of seconds it took to collect data

Photon count: The total number of photons collected so far, and the average number per pixel