

ILLUSTRATIONS

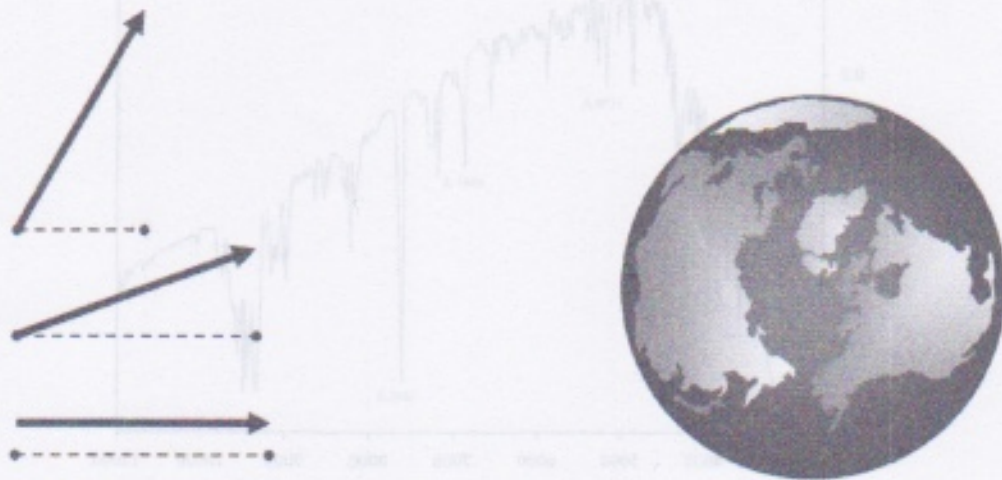


Figure 1. Each arrow represents the speed and direction of three objects moving toward the Earth. All three arrows are the same length, representing that all three objects are traveling at the same speed (for example, 100 km/sec). However, Doppler shifting only accounts for motion direct toward or away from an observer's line of sight and can only measure the speed of an object's direct approach. Because those three are approaching at different angles, they are closing the distance to Earth at different rates and thus would show different radial velocities. The bottom object's velocity arrow points directly at Earth, so its full 100 km/sec speed is directed toward closing the gap with Earth (the dashed line demonstrates the distance covered in one second). The middle object's path is notably deviated so the distance it covers is split along two paths: some of the path directed toward the Earth (the dashed horizontal line; *radial velocity component*), and some of it is directed across the Earth's line of sight (vertically; *transverse velocity component*). The top object approaches Earth at a very steep angle, so only a small portion of its velocity carries it toward the Earth, thus making its approach velocity comparatively low.

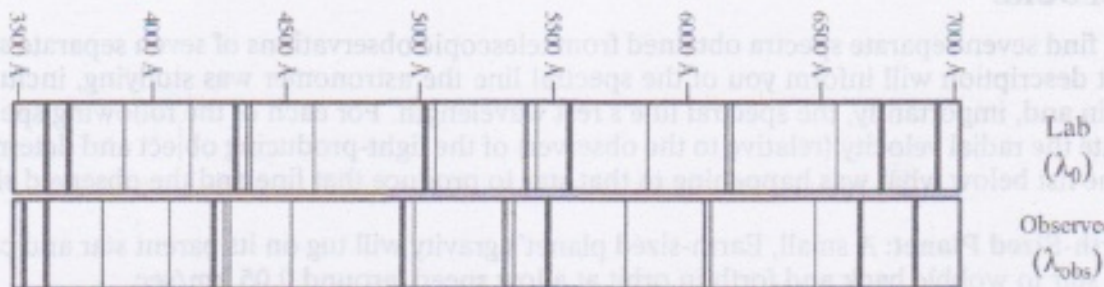


Figure 2. Two absorption spectra aligned with one another. The top absorption spectrum was created from an unmoving laboratory source, showing elemental spectral lines at their rest wavelengths. The bottom spectrum is produced by the same elements but all of the lines are shifted due to the motion of the light generating object. This is a blue-shift, visible in that the spectral lines have moved from longer wavelengths at λ_0 to shorter wavelengths (λ_{obs}). For example, the very first dark spectral line in the top spectrum has a wavelength of ~3600 Å; in the observed spectrum, that line has shifted to 3500 Å, a Doppler shift of ~100 Å.