6. Light is generally emitted at all wavelengths, and can be spread by a spectroscope into a **spectrum**. Spectra may contain spectral lines, either in emission or absorption. These spectral lines are determined by the chemical composition of the source and its temperature. This provides a basis for classifying stars and determining their compositions.

\[
\begin{align*}
\lambda & \rightarrow \\
\rightarrow & \leftarrow
\end{align*}
\]

7. Light sources moving relative to the observer have Doppler-shifted spectral lines. The relative change in wavelength $\Delta \lambda / \lambda$ is equal to the relative velocity $v$ divided by the speed of light $c$, or $\Delta \lambda / \lambda = v / c$. $\lambda$ is the wavelength the source would appear to have if it was motionless.

If the source is moving toward you, you observe a **blue shift** in the spectral lines. For a **receding** source, a **red shift** is observed.

The expansion of the universe was discovered by Hubble in this way. Also, the motions of stars and speeding cars can be inferred from the Doppler effect. Binary stars (two stars orbiting each other) or stars with planets can be detected from the Doppler shifts of their spectral lines.