When you look at the spectrum of a galaxy, you are really looking at the combination of spectra from the millions of stars in the galaxy. So studying the features of a galaxy spectrum tells you about the types of stars the galaxy contains, and the relative abundances of each type of star.

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| M51 Courtesy of [The Hubble Heritage Project](https://skyserver.sdss.org/dr1/en/proj/advanced/galaxies/spectra.asp#spectra) |

Galaxy spectra also clearly show you whether a galaxy contains star-forming regions called HII regions. HII is a spectral emission line that corresponds to ionized hydrogen - a hydrogen atom that has lost its electron. HII regions are areas of a galaxy where hydrogen nuclei and electrons are recombining to form neutral hydrogen.

) obtain the spectrum of something (let's say a galaxy) that shows spectral lines  
2) from the pattern of lines, identify which line corresponds to which atom, ion, or molecule  
3) measure the shift of any one of those lines with respect to its expected wavelength, as measured in a laboratory on Earth  
4) apply a formula that relates the observed shift to velocity along the line-of-sight