Activity 3: Calculating galaxy redshifts

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In this activity, we will once again use spectra from the Sloan Digital Sky Survey (SDSS), but this time of galaxies in order to find their *redshifts* and, hence, the velocity at which they recede from our galaxy. The activity aims at solidifying the understanding of what different wavelengths *mean* in the electromagnetic spectrum of light, and how these can be used to extract physical information of galaxies.

Instructions

The data we show in Figure 1 was taken from the Sloan Digital Sky Survey (SDSS) Sky Server[1]. This is a server which hosts up-to-date data taken mainly from the 2.5m SDSS Telescope in Apache Point, New Mexico. Your task will be to obtain the resdhifts of the galaxies shown in Figure 1:

1. Identify the H_β line in the spectra and its *observed* wavelength. With that, compute the redshift, z, using the formulae $1 + z = \lambda_{\rm obs}/\lambda_{\rm lab}$, where $\lambda_{\rm lab} = 4861.3$ Angstroms.
2. Using the computed redshift, estimate the recesion velocity of the galaxy by multiplying the redshift by the speed of light ($300,000$ km/s). Consider the radius of Earth is 6,400 km: how many Earth-radii per second are the galaxies moving away from us?
3. Use the received fluxes at Earth (the y-axis in Figure 1) as measures of how far away these galaxies are. Plot this measure versus the redshift: what do you observe?

[1] http://skyserver.sdss.org

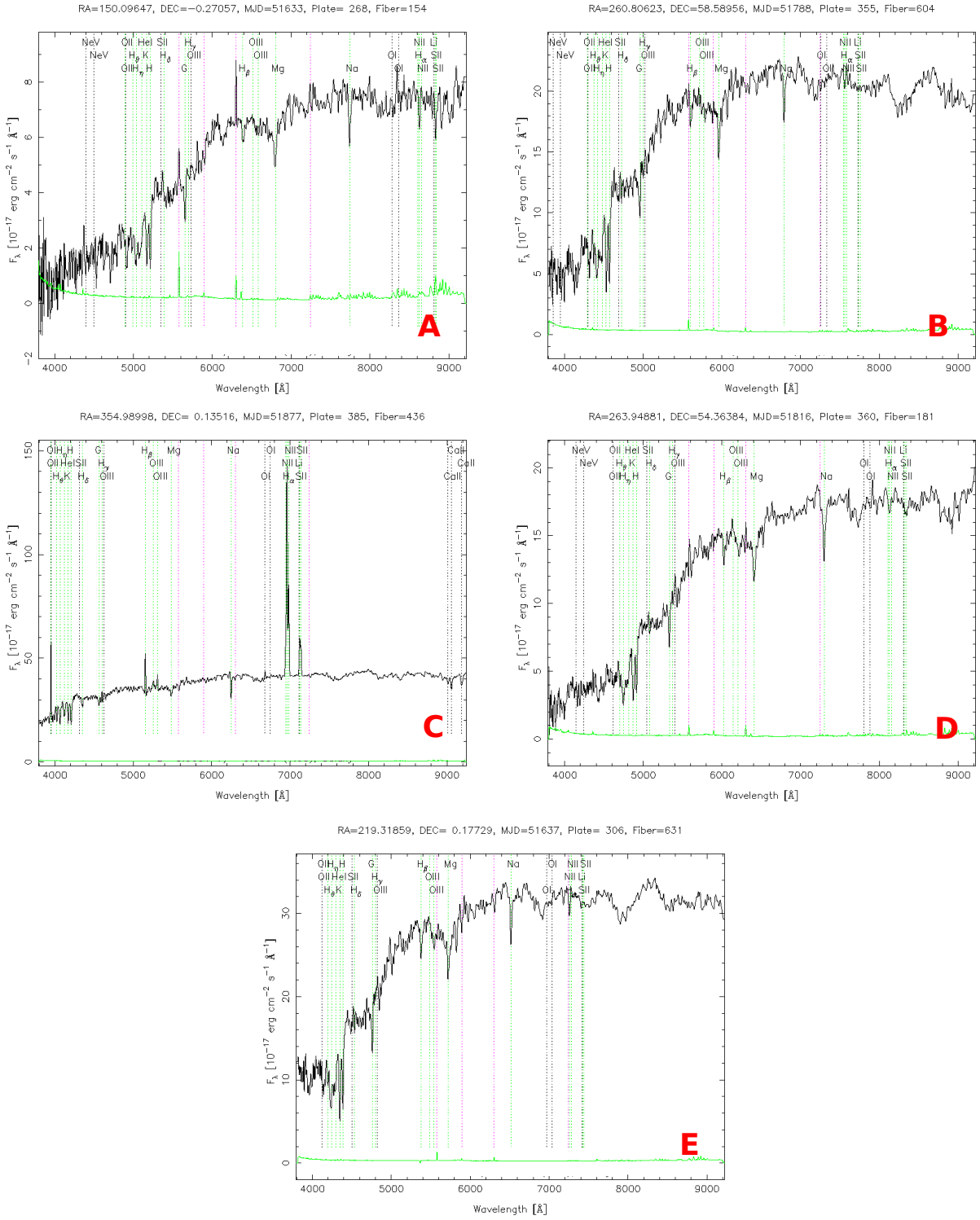

Figure 1: Set of real galaxy spectra for the activity. Data taken from the SDSS.