
Subject: Re: wavelength calibration

Posted by [DavidPS](#) on Mon, 22 Feb 2010 14:38:00 GMT

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On Feb 20, 5:38 am, sid <gunvicsi...@gmail.com> wrote:

> Hi,
> Please give some tips and suggesions on wavelength calibration for
> spectral data
> regards
> sid

I would be able to help you, but I need to know something else, which kind of spectra data you have and what you can use to calibrate it. Are you talking about a experiment on a lab where you have a lamp with a known wavelength or you are looking at a star where there is a lot of lines and a few assumptions to make.

regards,
David

Subject: Re: wavelength calibration

Posted by [ameigs](#) on Tue, 23 Feb 2010 17:07:51 GMT

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On 20 Feb, 05:38, sid <gunvicsi...@gmail.com> wrote:

> Hi,
> Please give some tips and suggesions on wavelength calibration for
> spectral data
> regards
> sid

Where is the spectra from? What type of instrument and do you have measurements of the dispersion as a function of instrument wavelength (and probably how it varies across your detector for a given setting) or a theoretical prediction for the dispersion of the instrument.

Steps:

1) Measure the dispersion accurately; ideally across the entire range for which you wish to use the instrument. In the visible (assuming), using various light sources (Ne, He, Hg, Ar, Xe pen-ray lamps are convenient), take as many different wavelength settings as you can that have at least 1 pair of lines from the lamps (more pairs equals better result for the variation across the detector at a given setting). Fit the line pairs (Gaussian, centroid, whatever, to determine the line centers on the detector in "pixel" space. Then the sometimes hard part; identify these lines. Once you are reasonably sure of the identifications, plot wavelength of the lines (from the

wavelength table you id'ed the line with) versus "pixel" for a particular instrument setting (wavelength). If this is a straight line (and you have a few pairs) then you're lucky and have a non-varying dispersion across the detector for that setting. Assuming near linear curve at all settings, then plot the slope of the line (nm/pixel) of each setting versus the instrumental wavelength setting. This will give you a good central (ie center of the detector) dispersion versus instrument setting curve which you can then either use appropriate interpolation, polynomial/spline fitting or best, fit the theoretical dispersion formula to this (nice for Czerny-Turner spectrometers). With this curve, then you can go on to step two.

2) Apply the dispersion along with the central dispersion to your pixel data ($\text{wave}[p] = \text{wave0}[p0] + (p-p0)*\text{dispersion}[\text{wave0}]$). This is your first guess. Now try to match up your line peaks to the wavelength tables (NIST, etc). $p0$ is the center pixel of your detector, wave0 is the instrument setting, $\text{dispersion}[\text{wave0}]$ is the dispersion from you nice curve from 1 at wave0 . You may find that you need to adjust $p0$.
