+ Summary of THID.PRO

+ Add about initial guess pass to THID.PRO and what WVC structure means + excel table

Summary of THid.pro and its dependencies:

Procedure CONTF:

This procedure preprocesses the ThAr echelle spectrum. Thid.pro before even trying to pick the good lines preprocess the observed spectrum to enhance plot visibility.

Thid.pro loops though each order individually and each order goes through the following process:

1. It takes the intensities for a given order (the spectrum) and finds a "continuum spectrum" . This spectrum gets input into procedure CONTF.
2. CONTF divides the spectrum in 10 (default) bins. So now we have each bin containing 1/10th of the spectrum
3. Within each bin, its sorts its values in ascending order
4. Then, it picks a value at a position "bpt" (name of the variable) out of the sorted values for every bin. CONTF picks the position bpt= 0.5 \*# of elements in a bin which for the default case is the index in the middle of each bin.
5. Thus, we end up with 10 values (one from each bin) that correspond to Y along with its X value. The X values were initially set up from 0 to the length of the spectrum (E.g. 0,1,2 ... length of spectrum)
6. From these 10 pair of values (x,y) he makes a third order least-square polynomial fit from which it finds the coefficients.  We reference the function represented by these coefficients as g(x).
7. Finally, CONTF returns g(x) where x are 0,1,2,3,4,5...... (length of spectrum). The returned vector has the same size as the inputted spectrum.
8. Presumably, the objective of THID calling this dependency is to get rid of the noise + gets that "smoothness" characteristic of a function.

Automatic line association handler:

Summary of variables/fields :

awin: half width of fit windows in pixels

m\_wid: number of marked lines

nm: number of marked lines

m\_wave: marked wavelength

m\_ord: marked order

m\_pix: marked pixel

m\_flag: marked line flag

minamo: minimum amplitude

maxres: maximum allowed residual in pixels

1. h=histogram (s, min=-20, max=20 )
2. gaussfit (xh, h, gpar, nterms=3)
3. For (every order in the Echelle normal)
4. iwhr =where ( th\_wair is within [wbeg,wend] )
5. for (every good line that we could find in our spectrum)

* th\_wav = actual value (wavelength) of “current” good line
* th\_pix = interpolation (npix,wave (\*,i), th\_wav ) [0]

1. Keep going

About Marking Lines:

THID.PRO :

ThAr : Thorium-Argon Spectrum collected by Chiron. The orders have been extracted already. Represeted by a 2-dimensional array: Nord x #Pixels, where Nord is the number of orders for the whole collected spectrum and #Pixels is the number of pixels for the whole collected spectrum.

THID.PRO refers to this process as ‘Automatic line association handler’. Once THID.PRO is called, typing ‘a’ will call this process. Three inputs are required from the user “awin”, “maxres” and “minamp” which refer to “half width of fit window [pixel]”, “maximum allowed residual [pixel]” and “minimum amplitude”, respectively. Detailed explanation for each input has been expanded bellow.

Assume to be at step where these three values have been set already. All the pixels of a given order are mapped to wavelengths using an initial guess. The initial guess are the coefficients of the polynomial . Where z is the wavelength, x is the pixels number and y is the pixels number times the corresponding order. The pixels are mapped to a wavelength using the procedure “mkwave.pro”. At this point we have all the wavelengths that correspond to a given order. Assume these wavelengths to be sorted where the smallest wavelength is wo and the biggest is wf

Out of all wavelength from “thid\_data.xdr” only those within [wo, wf] are being used. For every wavelength wi for some i within [wo, wf]

1. awin : half width of fit window [pixel]
2. maxres : maximum allowed residual [pixel]
3. minamp : minimum amplitude [ADU]