Measurements for HH 7-11: extinguished line plus continuum at four wavelengths. Label wavelengths 1-4: 0.656, 1.26, 1.28, 1.64 microns, and call the measurements (pixel values, fluxes) .

Take as priors: zero-reddening flux ratios 

Assume that

1. the extinction is all foreground, and described by the Draine and Weingartner calculations. The extinction factor is of the form , where
2. the scattered light continuum is characterized by a single blackbody temperature *T,* that we can determine by fitting to non-line emitting regions. It will be a pretty low temperature as there’s no continuum evident in the Hα image.

**TASK 1:** Determine a good value for *T* by fitting to to the fluxes of the continuum filament by HH 8.

Then for each pixel we have four equations in four unknowns: the extinction-corrected fluxes and  of the longer-wavelength [Fe II] and H I lines; the extinction , and the scale factor *C* that multiplies the blackbody function for the continuum:

**TASK 2:** Write code for solving the nonlinear four equation/four unknown system.

**TASK 3:** Use the code to generate images in ; that is, extinction-corrected [Fe II]1.64 and Paβ.

**Bonus TASK (added by Adam on request…) …** Wait now we want to do 3 equations:

We want equations relating (fFe, C) or (Av,C) or (fFe,Av). We should inspect all of these to see if anything convenient shows up. We can use just f2 and f4 to work this out since f3 depends on fH which will depend on everything else. Elim fFe via subtraction (f2-RFe\*f4 or multiplying everything by Rfe) to relate Av and C:

**~~Actually that was a mistake…~~**

Try a ratio of f2 and f4 where we elim C to relate fFe and Av:

Cross multiply:

Split the fFe terms and f2,f4 terms onto separate sides:

Factor out fFe and divide by rest:

One last way is relating fFe and C…but requires a trick. It would require trying logs (Av = log(f/…)):

We can get these in terms of the same base. We can change logy4 to logy2 since log laws tell us:

Apply this:

Relating the insides…

Ultimately, we would like something like one variable as a function of T. For example, Av(T), along with the other measured fluxes:

We cannot do that by say plugging fFe or C back into the log equation. Or otherwise plugging them back into the original first two equations. We already used those equations up to make this one. This is where our third equation will finally come into play…

With this, we can eliminate C with the other two equations to get equations relating fH, fFe, and Av. We can get two equations by relating f2 and f3 and dividing out C. We can get another two equations by relating f3 and f4 and dividing out C. Those will relate fH and Av. We can get another equation relating fH and C by eliminating Av between the two equations as well. Only needs to be done once with each pair (because otherwise we risk overusing the given equations). For example, we can relate f2 and f3 to get fH(fFe,C) and then f3 and f4 to get fH(fFe,Av).

…OR maybe we can solve this as a system of log equations?

**Now we can simply solve the rest as a function of Av! We have one relationship between fFe and Av:**

**And then another between C and Av:**

**And also get to solve for fH:**

**This means we have Av(T), and all the following are also solely in terms of T and f. This means given the original equations**

**We can plug f2,f3,f4,T into Av,fFe, C, and fH, get out these values, and…um…hrm this doesn’t work wait…**

We can also maybe try letting the continuum or extinction be constant between some equations, but it doesn’t necessarily simplify things…let’s try solving it as a classic dependent system, like gauss sort of…

We can use the second equation to eliminate C as:

Now we use this C and plug into the other two equations…

We can solve the second equation for fFe

And then plugging this into....

Ok, now to group terms…

So now we have a relationship between Av, fH, and T. What to do about fH? We need another relationship hmm a progress check…

Let’s plug fH into the other two for simplifying purposes…

Or C is

And then fFe is similarly (plugging C in…):

And now we plug all this into our original equations…seems like this will only be non-zero for f2 (testing on pen and paper):