SPECTROSCOPIC UNITS

CHRIS STOUGHTON

Spectra are expressed in various units:

- F_γ =photons/cm^2/$\mathring{A}$/sec
- F_λ = ergs/cm^2/$\mathring{A}$/sec
- F_ν = ergs/cm^2/Hz/sec
- F_{AB} = Magnitude

We express spectra in F_γ. The spectra we gathered for MKIDStd may be expressed in other units.

For spectra expressed in F_λ, we use $E = h\nu$ and $c = \lambda\nu$:

$$F_\gamma = F_\lambda \lambda / hc \tag{1}$$

The python package scipy.constants is a convenient way to get constants.

```
from scipy.constants import *
```

defines h=6.62606957e-34 Joule·sec and c=299792458.0 meters/sec.

For λ expressed in $\mathring{A}$:

$$F_\gamma = F_\lambda \times \lambda(\mathring{A}) \times \frac{10^{-10} m/\mathring{A}}{ch10^7 erg/J} = K \times F_\lambda \times \lambda(\mathring{A}) \tag{2}$$

where $K = 5.03E7/\text{erg}/\mathring{A}$.

Some spectra are expressed in AB magnitudes. Our good friends at `http://en.wikipedia.org/wiki/AB_magnitude` tell us that when flux is in erg/s/cm^2/$\mathring{A}$ the AB flux is

$$AB = -2.5 \log_{10} F_\lambda - 5 \log_{10} \lambda - 2.406 \tag{3}$$

Given an AB magnitude and λ in $\mathring{A}$,

$$F_\lambda = (10^{-2.406/2.5})(10^{-0.4AB})/\lambda^2 \tag{4}$$