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ASTR 8060

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Assignment: Final Project Draft

Planning:

I’m thinking about asking to get the spectra of stars in the Orion constellation. This specific part of the sky consists of several star forming regions which is why this can be a good target to analyze spectrum to get the properties of Young Stellar Objects (YSOs). Class I and class II YSOs have stellar disks. And it’s possible to find out the properties of the stellar disk by calculating the veiling of the spectrum.

What is veiling and why is it important?  
Accretion processes in Class I and class II YSOs produce strong emission lines for a few wavelengths’ region. The accretion continuum is blue while the photosphere of a young low-mass star is red, so the ratio of accretion to photospheric flux decreases to longer wavelengths. This ratio of accretion flux to photospheric flux at a wavelength is defined as the veiling for that wavelength. So, calculating the veiling can be a good way to measure how string the accretion disk is around those stars. I’m planning to calculate this veiling comparing the spectra with existing models.

Instruments:

To observe the young stars, I’ll need to observe in a wavelength region of 1.2 to 5 micrometers. Observing young stars in the near infrared is beneficial for several reasons. Young stars, especially those in star-forming regions, are often surrounded by significant amounts of dust. The NIR wavelengths can penetrate this dust more effectively than visible light, allowing astronomers to observe the stars behind the dust. Also, as young stars form, they are surrounded by protoplanetary disks and may have ongoing accretion processes. This leads to thermal emissions that are often strong in the NIR.

Also, the spectral resolution needs to be high enough (around or more than 50K) for observing the spectra of the young stars. Based on the information from NOIRLAB facilities [1], the best instrumentation to observe the spectra for young stars should be “IGRINS - 2”. As I’m targeting for only the region near Orion, which is near the celestial equator, either Gemini North or Gemini South would work.

[1] https://noirlab.edu/science/images/spectrographsimagers